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THE CICADIDÆ OF KANSAS.
By P. P. Lawson.

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The Cicadidæ of Kansas.

BY P. B. LAWSON.

For several years the writer has been interested in the Homopterous fauna of Kansas. He has in recent years written systematic papers on the *Coccidæ* and *Cicadellidæ* found in the state, and after working on the latter family, found himself much interested in the *Homoptera-Auchenorhynchi* as a group. In looking over the material belonging to this group in the Snow collections, he found that a very representative collection of cicadas was on hand and at once became interested in studying them. Most of this material had been gathered and arranged by Mr. R. H. Beamer, formerly assistant curator of the Snow collections. He himself had intended to publish on the group, but just as he was about ready to undertake the work, he gave up active work in entomology, and so his material fell into the writer's hands. The writer wishes therefore to acknowledge his indebtedness to him and also to Mr. Wm. T. Davis, who not only identified all the material sent him by Mr. Beamer and myself, but also sent me for study other specimens necessary for the prosecution of the work.

In the Journal of the New York Entomological Society, Vol. xxvi, Nos. 3 and 4, 1918, Mr. Davis published a paper on the cicadas of Mississippi. In this paper he records eighteen species from that state and remarks on this relatively large number of species within a single state. Records show that twenty-one species have been taken in Kansas, and specimens of these are now in the Snow collection. A pair of *Tibicen resonans* was very kindly given us by Mr. Davis for the collec-

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tion as this species has been taken only a single time in the state.

It is very likely that with more thorough and extensive collecting several more species will be found in Kansas. The writer has been greatly impressed with the number of cicadas that apparently reach one of the limits of their geographical distribution in the state. Thus the Kansas members of the western genus *Okanagana* seem to reach their eastern limit in the state. Similarly the eastern and southern genus *Tibicina* seems to reach its western limit with us. Various members of the genus *Tibicen* also just enter Kansas. Thus we have *T. bifidus* reaching eastward into the western counties. The eastern *T. pruinosa* seems to be very common in eastern Kansas but does not occur in the western part. The eastern and southern *T. lyricen* seems to reach its northwestern limit in the southeastern counties of our state. The southern *T. vitripennis* reaches its northern limit in the southern counties. The relatively eastern *T. marginalis* is found in the eastern two-thirds of the state, while the closely related *T. dealbata* evidently does not go much further east than central Kansas. Again, *T. linnei* seems to reach its western limit with us while *T. superba* and *T. eugraphica* are not found further north. *Proarna venosa* likewise finds its northern boundary in the state, and *Tibicinoides hesperius* is confined to the western counties and likely reaches its eastern limits with us.

This convergence in one state of so many species of varied distribution is undoubtedly due to its central geographical position, to the extremes of its rainfall, and to its varying elevation. Thus the eastern part of the state is distinctly mesophytic, starting with an elevation of 800 feet and with an average rainfall of as high as 45 inches. This condition gradually changes as one goes west over the gradually rising and drier portions of the state, till at its western border the elevation has reached 3,600 feet and the average rainfall has decreased to as low as 16 inches. With this change one finds a corresponding change both in the flora and fauna which is very evident even to the casual observer, at least as far as the flora is concerned. This latter change, combined with those causes which produce it, is undoubtedly responsible for the variety of insect forms and their distribution in the state, for it has repeatedly been found that in many if not all groups of insects, the eastern and

western faunas meet somewhere in the central portions of our state. This condition seems to prevail in spite of the fact that most life zone maps show nearly all of the state as belonging to the Upper Austral while just a few southeastern counties come into the northern limits of the Lower Austral.

An attempt has been made in this paper to start on a study of various structural characters to determine their importance as aids in systematic work. Thus a beginning has been made in the study of the ovipositors of the species occurring in the state. Much more work will be necessary before one could be dogmatic about their value, but at present it seems certain that in some cases at least the ovipositors are characteristic of the species. The writer hopes to continue this study with a larger series of each species as well as with more species and give his results in a future paper. Similarly the study of the last ventral segments of both sexes will in some cases reveal good taxonomic characters.

The form of the descriptions here given will also be rather new, but the attempt has been made to bring this form more into harmony with that used to describe the members of the other families of the same group. It is hoped that this might be an aid in the study of these families.

Characteristics of the Cicadidæ.

The *Cicadidæ* are a very interesting family belonging to the *Homoptera-Auchenorhynchi,* this group being distinguished from the *Homoptera-Sternorhynchi* by having the beak arising from the lower part of the head instead of apparently arising from between the prothoracic legs, as in the latter group.

To the *Homoptera-Auchenorhynchi* belong five families, of which the *Cicadidæ* are easily the largest insects. Aside, however, from their relatively larger size, there are very distinct and characteristic structural differences between this family and the others. Thus the members of the *Cercopidæ* and *Cicadellidæ* usually have their fore wings distinctly thicker than the hind wings, whereas in the *Cicadidæ* both pairs of wings are similar in texture. The antennæ of some of the *Fulgoridæ* are very irregular and peculiar in form, while those of the Cicadids are always setiform. Rarely do the members of the other families, the *Aphididæ* excepted, ever have three ocelli, this being a distinct characteristic of the *Cicadidæ.* The front femora also of these insects are quite characteristic, being thickened and toothed beneath. Finally the group is characterized by having males which are musical, so that each species has its peculiar song, a condition unknown in any other *Homoptera.*

Systematic Treatment of the Kansas Species.

Van Duzee in his catalogue has divided the *Cicadidæ* into three subfamilies, each of which is represented by one or more genera in Kansas. The following is his key to these subfamilies:

KEY TO SUBFAMILIES.

Tympanal coverings present in the male, 1.
Tympanal coverings absent in the male.
Subfamily 3 *Tibicininæ* (Dist.)

1. Tympanal coverings entirely concealing the orifices.
Subfamily 1 *Tibiceninæ* Van D.
Tympanal coverings imperfect, leaving the orifices more or less exposed. Subfamily 2 *Cicadinæ* Van D.

Subfamily TIBICENINÆ Van D.

The members of this subfamily are distinguished from those of the other two subfamilies by having the tympanal coverings entirely concealing the tympanal orifices. Most of our cicadas belong here.

The genus *Tibicen* is the only genus belonging to the *Tibiceninæ* that is represented in our Kansas fauna.

Genus TIBICEN Latr.

This genus contains species that vary much in size, ranging from very large to rather small forms. They all, however, have characteristically broad heads and their opaque abdomens taper regularly behind. The mesonotum completely covers the middle of the metanotum and the tympanal orifices of the male are completely hidden by the tympanal coverings. The opercula are large and usually are close together or overlap medially.

This is by far the largest genus in Kansas, fourteen of the twenty-one species of the state belonging here. These may be separated by the following key:

KEY TO SPECIES.

A. Large, heavy bodied species; uncus simple.
B. Uncus distinctly longer than broad, not triangular.
C. Uncus long, slender and curved, bifid apically.
bifida.

A. Large, heavy bodied species—*concluded.*

CC. Uncus broader, with broadly rounded apex.

D. Species light, not strongly marked with black; apex of wings strongly infuscated. *superba.*

DD. Species dark, strongly marked with black; apex of wings slightly infuscated.

E. Hind margin of pronotum or collar greenish.

F. Larger species, averaging 30 mm. or over in length, and with a distinct longitudinal black band on under side of the abdomen.

G. Margin of fore wings not bent; opercula broad, broadly rounded behind; males usually with attenuated pruinose stripe on dorsum of third segment. *pruinosa.*

GG. Margin of fore wings suddenly bent near the middle; opercula narrowed apically and more angulate behind. *linnei.*

FF. Smaller species, averaging about 25 mm. in length and without a distinct longitudinal black band on the under side of the abdomen. *aurifera*

EE. Hind margin of pronotum or collar blackish. *lyricen.*

BB. Uncus usually about as wide as long, usually triangular, but with the apex often truncate.

C. Wings long and slender; a large ferrugineous and black species. *resonans.*

CC. Wings broader; species greenish and black.

D. Very large species, expanding over 110 mm. Flaps of wings gray. *auletes*

DD. Smaller species, seldom expanding 110 mm. Flaps of wings usually with yellowish or orange tinge.

E. Fore wings with cross veins between R_3 and R_{4+5} and between the latter and M_1 distinctly darkened. Posterior margins of abdominal terga not lighter.

F. Abdominal terga with a dorsal row of pruinose spots; uncus somewhat triangular, apex obtuse. *dorsata.*

FF. Abdominal terga without dorsal pruinose spots; uncus broadly truncate apically. *resh.*

EE. Fore wings with cross veins between R_3 and R_{4+5} and between the latter and M_1 not at all or slightly darkened. Posterior margin of abdominal terga lighter.

F. Head broad, wings rather narrow; abdominal terga without dorsal pruinose spots and not strongly pruinose laterally. *marginalis*

FF. Head narrower, wings broader; abdominal terga with dorsal row of pruinose spots and strongly pruinose laterally. *dealbata.*

AA. Small species; uncus wishbone shaped.

B. Orange and black species; arms of uncus strongly curved and widely separated apically, arms of ventral piece stout when viewed caudally. *eugraphica.*

BB. Green and black species; arms of uncus straighter and not as widely separated apically, arms of ventral piece slender when viewed caudally. *vitripennis.*

Tibicen bifidus (Davis).

(Pl. xxi, figs. 1-2; pl. xxv, fig. 4; pl. xxvi, fig. 9; pl. xxvii, fig. 13.)
Cicada bifida Davis, Jl. N. Y. Ent. Soc., xxiv, p. 47, 1916.
Tibicen bifidus Van D., Cat. Hemip. N. A., p. 489, 1917.

A black and yellowish-brown species of medium size. Specimens at hand measure from 25 to 29 mm.

Color: Head black, with the following marked with yellowish-brown, sometimes tinged with green: The antennal ledges, a triangular spot in front of ocelli, a spot of varying size just in front of this, and irregular spots along the caudal margin laterad of the ocelli. Pronotum yellowish- to brownish-green, pruinose in spots, with a large black median T-shaped or triangular spot extending from the collar to the head, which often contains a yellowish-green spot. The grooves are blackened in varying degree and often have black spots between them. Collar with black spots in the humeral angles and often some between these and the median spot. Mesonotum black, often pruinose in spots, with the W-shaped mark and the sides yellowish-green, as is also the cruciform elevation, the anterior arms of the latter almost touching the W. Abdominal terga black with the sides brownish-yellow, the last tergum being almost wholly light, with a faint dorsal row of pruinose spots and often with pruinose markings laterally. Wings with the branches of the veins nearly all black, the costal margin and the bases of the veins, radius and extreme base of media excepted, yellowish-brown; cross veins between R_3 and R_{4+5} and between latter vein and M_1 distinctly darkened. Basal areoles of fore wings with dark dash; flaps of both wings whitish, those of fore wings often with an orange tinge. Beneath nearly unicolorously yellowish-brown except for darker head. Legs, especially prothoracic pair, streaked with dark.

Form: The following are the measurements in millimeters of the specimens at hand:

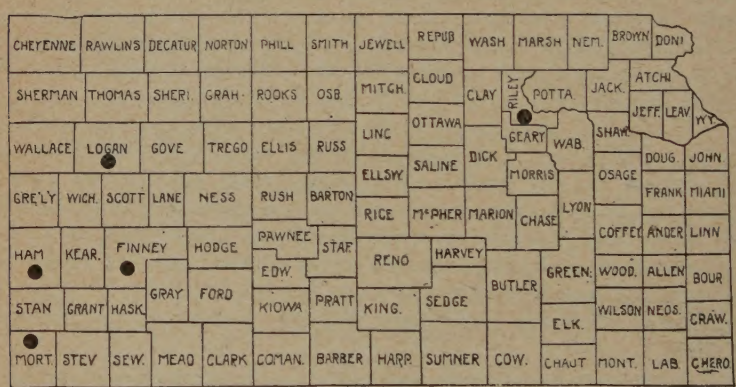
Length of body	25	to 29
Width of head	9	to 9.5
Expanse of fore wings	71	to 74
Greatest width of fore wing	11.5	to 12.5
Greatest width of operculum	6	
Greatest length of operculum	9	

The opercula are fully half as long as the abdomen, overlapping nearly two-thirds their length, then evenly narrowing on both margins to the subacute apices.

Genitalia: Supra-anal plate of male with small, stout, median process and with the lateral angles rounded. The uncus, when viewed laterally,

is long and slender and strongly curved and when viewed caudally is widest at the base, then narrowed till near the broadened and distinctly bifid apex. The ventral piece is strongly U-shaped, the arms stout, slightly notched apically, and connected with membranous tissue till near their apices. The last ventral segment of the male is over one-half longer than wide, lateral margins nearly straight, the posterior margin distinctly but not deeply emarginate. The pygofers of the female have a strong median process. The last ventral segment is broadly notched posteriorly nearly one-third the distance to the base. Each of the lateral pieces of the ovipositor bears about fourteen teeth or ridges, at least in the specimen examined, of which the basal ones are small and far apart, the median four or five being quite large, and the terminal four small and crowded.

Distribution: The specimens at hand were taken in the western part of the state in Morton, Hamilton, Logan and Finney counties. In the collection of the Kansas State Agricultural College are specimens from Logan and Riley counties. Outside of Kansas this species is reported to occur in Colorado, Utah and Arizona. The following map shows its distribution in Kansas as far as is now known:



Remarks: Of the large number of specimens at hand four are paratypes.

Tibicen superba (Fh.).

(Pl. xxi, figs. 3-4; pl. xxiv, fig. 4; pl. xxvi, fig. 12; pl. xxvii, fig. 18.)

Cicada superba Fh., Trans. N. Y. St. Agr. Soc., xiv, (1854), p. 745, 1855.
Cicada superba Uhl., Trans. Md. Acad. Sci., i, p. 152, 1892.
Tibicen superba Van D., Cat. Hemip. N. A., p. 494, 1917.

A fairly large insect of a beautiful greenish-buff color, sparingly marked with black. Specimens at hand measure from 30 to 33 mm.

Color: Head greenish-buff with a broad transverse black band between the eyes and two small black spots at the base of the front. Pronotum in

our specimens is entirely greenish-buff. Mesonotum of the same color with black spots as follows: A pair between the arms of the W, a small triangular pair laterad of these, a still smaller pair just above base of fore wings, and a small spot mesad of the tips of the anterior arms of the cruciform elevation. Abdominal terga not as green as the rest of the body, with small pruinose spots laterally at the base of the first segment and with the base of the second segment sometimes narrowly black. The wings are distinctly smoky apically, the veins being olive-green basally, becoming brown apically. The cross veins between R_3 and R_{4+5} and between the latter and M_1 are strongly and widely infuscate. The basal areoles of the fore wings are greenish anteriorly. The flaps of both wings are dark gray. Beneath the insect is brownish or buff and entirely pruinose. The legs are of the same color as the underside, distinctly striped and slightly darkening apically.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	30	to	33
Width of head	13.5	to	13.75
Expanse of fore wings	86	to	90
Greatest width of fore wing	12	to	12.5
Greatest width of operculum	6.5	to	7
Greatest length of operculum	9.5	to	10

The opercula are distinctly longer than wide, the lateral margins are slightly sinuate, the mesal margins slightly overlap, and the posterior margins are rounded but with the mesal portion distinctly longer and straighter than the outer part.

Genitalia: Supra-anal plate of male with a stout median tooth which exceeds the rounded lateral angles. The uncus, viewed laterally, is distinctly curved and widens distally to the obtuse apex. Viewed caudally it is a large sclerite nearly twice as long as wide, scarcely narrowing to the broadly rounded apex, and with the usual depression on the dorsal part of its caudal aspect. The ventral piece has its arms widely but not deeply separated. The last ventral segment of the male is distinctly less than twice as wide as long and is strongly rounded posteriorly. The pygofers of the female have a stout and rather short median spine which exceeds the obtusely angulate lateral angles. The last ventral segment of the female has the lateral margins distinctly sinuate, the posterior margin with a broad angular emargination which reaches half way to the base. The lateral pieces of the ovipositor each bear at first five low ridges followed by two prominent teeth and then about six small and indistinct teeth.

Distribution: The only record we have of the occurrence of this species in the state is from Barber county. It seems to be a distinctively southern species as shown by its distribution as given by Van Duzee, who records it from Arkansas, Oklahoma, New Mexico and Texas.

Tibicen pruinosa (Say).

(Pl. xviii, figs. 3-4; pl. xxiv, fig. 3; pl. xxvi, fig. 10; pl. xxvii, fig. 10.)

Cicada pruinosa Say, Jl. Acad. Nat. Sci. Phila., iv, p. 330, 1825; Compl. Writ., ii, p. 251.

Cicada pruinosa Harris, Rept. Ins. Mass., p. 176, 1841.

Cicada bruneosa Wild, Ann. Soc. Ent. Fr., ser. 2, x, Bul., p. xviii, 1852.

Cicada pruinosa Harris, Treat. Ins. Inj. Veg., edn. 3, p. 218, 1862.

Cicada canicularis Prov., Pet. Faune Ent. Can., iii, p. 211, 1889.

Cicada pruinosa Davis & Jout., Ent. News, xvii, p. 237, 1906.

Cicada pruinosa Sm. & Grsb., Ent. News, xviii, p. 123, 1907.

Tibicen pruinosa Van D., Cat. Hemip. N. A., p. 490, 1917.

Tibicen pruinosa Davis, Jl. N. Y. Ent. Soc., xxvi, p. 145, 1918.

A green and black species of fairly large size. Specimens at hand measure from 29 to 33 mm.

Color: Head black, with the following marked with green or brownish-green: The antennal ledges and the space between them and the eyes, a median elliptical spot on upper portion of front, sometimes three spots at base of the front, and the posterior margin between the ocelli and the compound eyes. Pronotum green or brownish-green except for two large black median spots which taper caudad, uniting just before the collar, and enclosing an elongate greenish spot. Frequently some of the grooves, parts of the lateral margins, and the portions just behind the eyes, are tinged with black. Mesonotum green, marked with black as follows: The spaces between the arms of the W, a spot on each side laterad of the arms which are joined sometimes by a slender line with a spot on the posterior margin, laterad of these a third pair of spots which may join the second pair posteriorly, and with a large spot between the W and the light cruciform elevation, its apex reaching up between the inner arms of the former. Abdominal terga entirely black, first segment with large lateral pruinose spots which sometimes reach over to the second segment, the third segment sometimes with attenuated lateral stripes, the eighth segment and the seventh of the female also pruinose laterally. Wings with veins greenish basally, except the base of media, becoming brown on apical half, and with the cross veins between R_3 and R_{4+5} and between the latter vein and M_1 distinctly darkened. Basal areoles of the fore wings greenish but without distinct dash; flaps of fore wings grayish, those of hind wings gray, becoming white posteriorly. Beneath more or less strongly pruinose except for shining black median portion of the abdomen. Legs light, darkening towards the tips of the tibiæ.

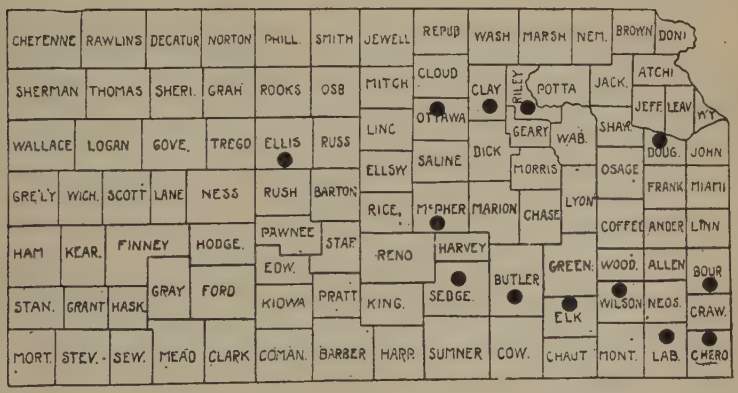
Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	25	to	29
Width of head	12	to	13.5
Expanse of fore wings	96	to	100
Greatest width of fore wing	13.5	to	15
Greatest width of operculum	7	to	7.5
Greatest length of operculum	9.25	to	9.75

Opercula, excluding the extension beyond the coxal cavity, about as long as broad, overlapping medially, and rounded apically but with inner apical margin straighter and longer than the outer.

Genitalia: Supra-anal plate of male with a strong median process which exceeds the rounded lateral angles. Uncus, when viewed laterally, is stout, straight, and parallel-margined till near the apex, when the caudal margin suddenly tapers to the acute apex. Viewed caudally it is a large sclerite, over one-half longer than wide, with a broadly rounding, nearly truncate, subapically depressed apex, and with a large triangular depression on the dorsal part of its caudal aspect. The ventral piece is strongly V-shaped, with the arms rather slender when viewed caudally but appearing stout from a lateral view. The last ventral segment of the male is twice as wide as long, the lateral margins very slightly sinuate, the apex broadly rounded. The pygofers of the female have a slender and acute median process which greatly exceeds the lateral angles. Last ventral segment of the female with a broad, distinctly angulate notch reaching nearly half way to the base. In the specimen examined the lateral pieces of the ovipositor each bore about a dozen ridges or teeth, of which the first four were ridge-like and the rest more tooth-like.

Distribution: This is one of our commonest species. In and around Lawrence it is by far the commonest form. As shown by the following map it is decidedly eastern in its distribution in the state. The record from Riley county is that of the Kansas State Agricultural College. Van Duzee records it from the following other states: Pennsylvania, Indiana, Missouri, Nebraska and Texas. Davis says its distribution is that of the general region of the valley of the Mississippi.



Remarks: Davis speaks of the song of this species as follows: "The song of *pruinosa* is quite unlike that of any of the other large native cicadas, and may be rendered as *z-zape, z-zape, z-zape.* The insect often remains quiet all day, singing from about 3 or 4 p. m. until dark."

Tibicen linnei (Sm. & Grsb.).

(Pl. xviii, figs. 1-1; pl. xxiv, fig. 2; pl. xxvi, fig. 11; pl. xxvii, fig. 16.)

Cicada linnei Sm. & Grsb., Ent. News, xviii, p. 127, 1907.
Cicada tibicen Germ., Mag. d. Ent., iv, p. 95, 1821.
Fidicina tibicen Walk., List Homop., i, p. 94, 1850.
Thopha chloromera Walk., List Homop., i, p. 43, 1850.
Cicada tibicen Fh., Trans. N. Y. St. Agr. Soc., xv, p. 367, No. 73, 1856.
Cicada tibicen Harris, Treat. Ins. Inj. Veg., edn. 3, p. 219, 1862.
Cicada tibicen Uhl., Stand. Nat. Hist., ii, p. 227, 1884.
Cicada tibicen Woodw., Psyche, v, p. 68, 1888.
Cicada tibicen Uhl., Trans. Md. Acad. Sci., i, p. 149, 1892.
Cicada tibicen Macg., Can. Ent., xxxiii, p. 82, 1901.
Cicada tibicen Felt, N. Y. St. Mus. Memoir, 8, i, p. 237, pl. 46, fig. 1, 1905.
Rihana tibicen Dist., Cat. Homop., Cicadidæ, p. 36, 1906.
Cicada tibicen Davis & Jout., Ent. News, xvii, p. 238, 1906.
Cicada tibicen Tuck., Kans. Univ. Sci. Bul., iv, p. 64, 1907.
Cicada linnei Davis, Jl. N. Y. Ent. Soc., xxiii, p. 10, 1915.
Tibicen linnei Van D., Cat. Hemip. N. A., p. 490, 1917.
Tibicen linnei Davis, Jl. N. Y. Ent Soc., xxvi, p. 146, pl. 7, fig. 1, 1918.

A green and black species looking like *T. pruinosa* in form and color. Specimens at hand measure from 30.5 to 33 mm.

Color: Head mostly black, with the following marked with green: A broad stripe on each side along antennal ledge from front to eyes, these stripes each with a small black spot near the front, an elliptical spot on upper portion of front connected with a median triangular spot at base of front, and with irregular marks along posterior margin laterad of each lateral ocellus. Pronotum green, with two large black posteriorly tapering median spots which enclose a wedge-shaped green mark, and with the grooves and back of the eyes frequently black, there sometimes being a black spot also on the lateral margins. Mesonotum green, marked with black as follows: Between the arms of the W, a large spot on each side laterad of this which extends taperingly to posterior margin, a smaller spot on each side laterad of these, and a large spot cephalad of the light cruciform elevation, this spot having a narrow anterior process which reaches between the median arms of the W. Abdominal terga black, the posterior margins sometimes being testaceous. First segment in males with a pair of small but distinct pruinose spots. The wings have the veins, with the exception of media, greenish basally and becoming brownish apically. The cross veins between R_3 and R_{4+5} and between the latter vein and M_1, are strongly and broadly infuscated. The basal areoles of the fore wings are green. The flaps of both wings are grayish or brownish. Beneath the insect varies from greenish to testaceous, the opercula being lighter than the rest of the under side and fresh specimens are entirely pruinose with the exception of the black median portion of the abdomen. The legs are light brown or greenish with a tendency to darken apically.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	30.5	to	33
Width of head	14.25	to	15
Expanse of fore wings	94	to	100
Greatest width of fore wings	14	to	14.5
Greatest width of operculum	6.5		
Greatest length of operculum	8	to	8.5

The costal margin of the fore wings is slightly but distinctly bent near the middle. The opercula are longer than broad. They slightly overlap along their mesal margins, the lateral margins are sinuately narrowed posteriorly and the posterior margin runs cephalo-mesad in a straight line from the rounded lateral angles.

Genitalia: Supra-anal plate of male with a very broad but short median spine which scarcely exceeds the rounded lateral angles. Uncus, when viewed laterally, is curved on its posterior margin to the semi-obtuse apex. When viewed caudally it is a large sclerite less than twice as long as wide and gradually tapering from the base to the broadly rounded apex. The upper portion of the caudal aspect shows a large triangular depression. The ventral piece is U-shaped with the arms fairly deeply divided. The last ventral segment of the male is over twice as wide as long, and slightly emarginate apically. The pygofers of the female have a prominent and acute median spine which strongly exceeds the strongly-angled lateral angles. The last ventral segment of the female has the lateral margins sinuate and the posterior margin broadly and angularly emarginate nearly one-half the distance to the base. The lateral pieces of the ovipositor each bear about twelve teeth or ridges, of which the median four alone are distinct.

Distribution: The only Kansas records for this species are from Sedgwick, Douglas and Clay counties, the former two by E. S. Tucker and the last by Wm. T. Davis. Outside of Kansas it is found in Massachusetts, New York, Michigan, Tennessee, North Carolina, Illinois, and Mississippi, so that Kansas would seem to be its western limit.

Remarks: Davis says that the song of this species is a continuous *z-ing,* generally of a short duration. All the specimens examined by the writer were from North Carolina.

Tibicen aurifera (Say).

(Pl. xxii, fig. 1-2; pl. xxiv, fig. 5; pl. xxvi, fig. 15; pl. xxvii, fig. 12.)

Cicada aurifera Say, Jl. Acad. Nat. Sci. Phila., iv, p. 332, 1825; Compl. Writ., ii, p. 252.
Cicada aurifera Woodw., Psyche, v, p. 68, 1888.
Cicada aurifera Uhl., Trans. Md. Acad. Sci., i, p. 153, 1892.
Cicada aurifera Kirk., Ent., xxxiii, p. 242, 1900.
Cicada aurifera Macg., Can. Ent., xxxiii, p. 80, 1901.
Cicada aurifera Davis, Jl. N. Y. Ent Soc., xxiv, p. 44, 1916.
Tibicen aurifera Van D., Cat. Hemip. N. A., p. 492, 1917.

A rather small species usually green and black but sometimes varying to reddish-brown and black, having the body covered with a golden pubescence. Specimens at hand vary from 23 to 26 mm. in length.

Color: Head black, with the following marked with greenish to brownish: The antennal ledges and a broad spot between them and the eyes, a median elliptical spot on upper portion of the front with sometimes a spot caudad of this, spots at basal angles of the front, a spot laterad of each lateral ocellus, and irregular spots between these

and the eyes along the posterior margin. Pronotum largely greenish, sometimes varying to reddish-brown, with two irregular black spots enclosing a median wedge-shaped green spot. Mesonotum green to reddish-brown, marked with black as follows: Between the arms of the W, a large spot tapering to posterior margin on each side laterad of the W, and a smaller spot on each side laterad of this, the latter two spots on each side often fusing, and a large black spot in front of the cruciform elevation with a long slender point reaching between the two middle arms of the W. Abdominal terga usually black, though sometimes the posterior margins are testaceous. Wings with veins all greenish to reddish-brown basally, becoming darker apically. The cross veins between R_3 and R_{4+5} and between the latter and M_1 are distinctly darkened and practically spot-like. The basal areoles of the fore wings are greenish anteriorly; the flaps of both wings are grayish. Beneath brownish, entirely pruinose when fresh, rubbed specimens showing oblong black spot at base of each abdominal sternite. Opercula usually lighter than rest of under side. Legs light, excepting front legs, becoming darker apically.

Form: The following are the measurements in millimeters of the specimens at hand:

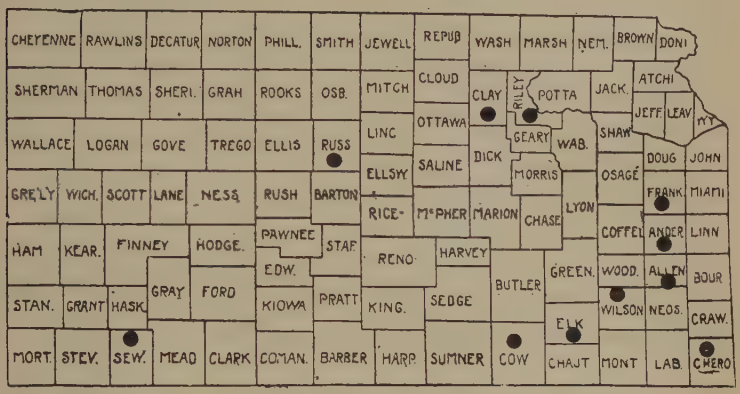
Length of body	23	to 26
Width of head	10	to 12
Expanse of fore wings	66	to 76
Greatest width of fore wing	10	to 11
Greatest width of operculum	5	to 5.5
Greatest length of operculum	7.5	to 8

The opercula are slightly overlapping medially, the apices are very broadly rounded, the inner margin being slightly longer than the outer.

Genitalia: The supra-anal plate of the male has a stout but acute median spine, which clearly exceeds the rounded lateral angles. The uncus when viewed laterally is curved and widens till near the apex, when the inner margin suddenly tapers and forms an angle with the outer margin. Viewed caudally it is a large sclerite, about twice as long as wide, scarcely tapering to the broadly rounded apex, and broadly and rather deeply emarginate dorsally. The ventral piece is deeply U-shaped. The last ventral segment of the male is fully twice as wide as long and hemispherical in outline. The pyfogers of the female have a stout but very acute median spine which strongly exceeds the lateral angles. The last ventral segment of the female is distinctly sinuate laterally and the posterior margin is broadly but angularly emarginate fully one-half of the distance to the base. The ovipositor has lateral pieces, each bearing about fourteen teeth or ridges, which are for the most part separated by deeper incisions than in the other species examined. The ovipositor in this case seems to be specifically distinct.

Distribution: This species has so far been reported from Kansas only. It is apparently most abundant in the eastern part of the state, as shown by the county records on the follow-

ing map. The records from Riley, Cowley and Russell counties are those of the Kansas State Agricultural College. Further collecting will doubtless reveal this species from the neighboring states.



Tibicen lyricen (De G.).

(Pl. xviii, figs. 5-6; pl. xxiv, fig. 1; pl. xxvi, fig. 8; pl. xxvii, fig. 11.)

Cicada lyricen DeG., Memoires, iii, p. 212, pl. 32, fig. 23, 1773.
Cicada fulvula Osb., Ent. News, xviii, p. 322, 1906.
Cicada lyricen Sm. & Grsb., Ent. News, xviii, p. 125, 1907.
Cicada lyricen Barb., Proc. Ent. Soc. Wash., xiv, p. 210, 1912.
Tibicen lyricen Van D., Cat. Hemip. N. A., p. 491, 1917.
Tibicen lyricen Davis, Jl. N. Y. Ent. Soc., xxvi, p. 147, pl. 8, fig. 1, 1918.

A black and fulvous species of about the same size or slightly larger than *T. pruinosa*. Specimens at hand measure from 31 to 34 mm.

Color: Head black, with the following marked with fulvous: The antennal ledges and a spot from them to the eyes, a median elliptical spot on the upper portion of the front, caudad of this a triangular median spot, a spot laterad of this at each corner of the front, a spot laterad of each lateral ocellus, and irregular spots on posterior margin of head laterad of the latter. The eyes are dark fulvous. Pronotum mostly fulvous in our specimens but with collar and lateral margins always black, and with two large black median lines which, narrowing posteriorly, meet at the collar, thus enclosing an elongate, median, fulvous spot. Mesonotum fulvous, with space between outer arms of W entirely black, a black spot on each side laterad of this, a black line on each side near the margin, and a large black spot between the W and the usually fulvous cruciform elevation. Abdominal terga black, the posterior margin of the first segment sometimes fulvous. Pruinose markings on first segment either absent, reduced to lateral spots, or forming a narrow line. In some specimens lateral pruinose spots on the seventh tergite are visible from above. Wings, with the exception of the black basal portion of media, have the veins greenish on basal half and dark fulvous apically. Some-

times the green is largely replaced by the fulvous. The cross veins between R_3 and R_{4+5} and between the latter vein and M_1 are distinctly darkened. The basal areoles of the fore wings for the most part are greenish; flaps of fore wings dark gray, those of hind wings lighter. Beneath the body is entirely pruinose with the exception of the black median portion of the abdomen. The opercula are paler than the rest of the body. The legs are fulvous, becoming paler apically.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	31	to	34
Width of head	14	to	15
Expanse of fore wings	100	to	102
Greatest width of fore wing	14	to	15
Greatest width of operculum	6.5	to	7
Greatest length of operculum	9	to	10

The opercula are about as broad as long, excluding the extension beyond the coxal cavity. They overlap medially and the posterior margins are broadly rounded, the inner margin of the apex being longer and straighter than the outer margin.

Genitalia: The supra-anal plate of the male has a stout median spine which scarcely exceeds the rounded lateral angles. The uncus, when viewed laterally, is stout and curved, the inner margin tapering rather suddenly apically to the obtuse apex. Viewed caudally it is a large sclerite, distinctly narrowed toward the obtusely rounded apex, and with a large triangular depression on the dorsal portion of its caudal aspect. The ventral piece is strongly U-shaped. The last ventral segment of the male is fully twice as broad as long and slightly but distinctly emarginate apically. The pygofers of the female have a slender and acute median process which greatly exceeds the lateral angles. The last ventral segment of the female is very broad and narrow, the lateral margins distinctly sinuate, and the posterior margin with a large and broadly rounded emargination which reaches about one-third of the distance to the base. The ovipositor is rather sparsely toothed, each lateral piece bearing about ten rather blunt teeth or ridges.

Distribution: Specimens of this species have been taken in Cherokee, Wilson, Elk, and Riley counties. It may be that this state is its northwestern limit for Van Duzee records it as an eastern and southern form found in Ontario, Rhode Island, New York, New Jersey, North Carolina, Florida, Alabama, Ohio, and Indiana. Smith and Grossbeck record it from New Brunswick also.

Remarks: Davis states that the song of this species is a monotonous *zing*.

Tibicen resonans (Walk.).

(Pl. xix, figs. 3-4; pl. xxiv, fig. 6; pl. xxvi, fig. 13; pl. xxvii, fig. 9.)

Cicada resonans Walk., List Homop., i, p. 106, 1850.
Cicada resonans Davis, Jl. N. Y. Ent. Soc., xxiii, p. 6, pl. 1, fig. 2, 1915.
Tibicen resonans Van D., Cat. Hemip. N. A., p. 493, 1917.
Tibicen resonans Davis, Jl. N. Y. Ent. Soc., xxvi, p. 148, 1918.

A ferrugineous and black species of large size. Specimens at hand measure from 38 to 40 mm.

Color: Head black, with ferrugineous spots as follows: Along the antennal ledges and on to the eyes, a median and two lateral spots at the base of the front, and irregular marks along the posterior margin laterad of the lateral ocelli to the eyes. Pronotum mostly ferrugineous with the grooves, an almost continuous line along the anterior margin, parts of the lateral margins and other variable spots, black. Mesonotum ferrugineous with black spots as follows: Between the arms of the W, a usually smaller spot on each side laterad of this, a spot along each lateral margin, and a large transverse spot cephalad of the ferrugineous cruciform elevation which has a slender anterior process reaching between the median arms of the W. The wings have the veins entirely ferrugineous as are the basal areoles of the fore wings. The cross veins between R_3 and between R_{4-5} and between the latter vein and M_1 are clearly but not strongly darkened. The flaps of both wings are grayish or buff. The abdominal terga are black. Beneath the insect is dark brown or ferrugineous with the opercula lighter. The specimens at hand are partly pruinose. The legs are ferrugineous.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	38 to 40
Width of head	17 to 17.5
Expanse of fore wings	115
Greatest width of fore wing	15
Greatest width of operculum	8
Greatest length of operculum	8

Opercula, excluding extension beyond the coxal cavity, broader than long, overlapping for a short distance medially, the posterior margins forming a broad and nearly regular curve.

Genitalia: Supra-anal plate of male with a broad but shallow median emargination which bears a broad and short but distinct median tooth which is shorter than the lateral angles. The uncus, when viewed laterally, is broad basally, narrowed medially, and then expanding apically much like a horse's foot. Viewed caudally it is broader than long, slightly narrowing to the broad, truncate apex. The ventral piece is strongly U-shaped, its arms turning strongly laterad apically. The last ventral segment of the male is distinctly less than twice as broad as long, the lateral margins regularly narrowing to the broad truncate apex. The pygofers of the female have an acute median tooth which distinctly exceeds the lateral angles. Last ventral segment of the female with sinuate lateral margins, the posterior margin broadly and angularly emarginate

half way to the base. The ovipositor is characterized by the regularity of the teeth of the lateral pieces each of which bears about ten teeth or ridges.

Distribution: The only record of this species for the state is that given by Mr. Wm. T. Davis who reports a single specimen from Kansas in the Museum of Comparative Zoölogy. Van Duzee gives North Carolina, Georgia, Florida, and Alabama as the other states in which it occurs. Davis reports specimens from Mississippi and Louisiana in addition. Thus it is seen to be a distinctively southern species.

Remarks: Davis reports this species as being found in the sand ridges in North Carolina. The specimens examined were kindly sent me by him from this state.

Tibicen auletes (Germ.).

(Pl. xix, figs. 5-6; pl. xxv, fig. 1; pl. xxvi, fig. 1; pl. xxvii, fig. 1.)

Cicada auletes Germ., Silb. Rev. Ent., ii, p. 65, 1834.
Tettigonia grossa? Fabr., Syst. Ent., p. 678, 1775.
Cicada grossa Oliv., Encyc. Meth., v, p. 747, 1790.
Cicada auletes Harris, Rept. Ins. Mass., p. 176, 1841.
Cicada sonora? Walk., List Homop., i, p. 105, 1850,
Cicada literata Walk., List Homop., i, p. 91, 1850.
Cicada auletes Harris, Treat. Ins. Inj. Veg., edn. 3, p. 218, 1862.
Cicada marginata How., Insect Book, p. 232 (*emarginata*), pl. 28, fig. 19, 1905.
Cicada marginata Sm. & Grsb., Ent. News, xviii, pl. 3, fig. 1, 1907.
Rihana grossa Dist., Genera Ins., fasc. 142, p. 29, 1912.
Cicada auletes Davis, Jl. N. Y. Ent. Soc., xxiii, p. 2, pl. 1, fig. 1, 1915.
Cicada auletes Weiss, Ent. News, xxvii, p. 162, 1916.
Tibicen auletes Van D., Cat. Hemip. N. A., p. 492, 1917.
Tibicen auletes Davis, Jl. N. Y. Ent. Soc., xxvi, p. 149, 1918.

A greenish-brown and black or nearly fulvous and black species of very large size. This is the largest of our cicadas, the specimens at hand measuring from 40.5 to 42 mm.

Color: Head black, marked with greenish-brown as follows: A spot along antennal ledges which broadens on towards the eyes, an elongate median spot on upper portion of front, a median and two lateral spots at base of front, and irregular spots beginning laterad of the lateral ocelli and extending along posterior margin to the eyes. Pronotum mostly greenish-brown, with two, black, triangular, median spots tapering posteriorly to the collar and enclosing an elongate light stripe and each, in our specimens, with a fulvous spot in anterior portion. The portion back of the eyes is also black and connects with a black narrow line which runs along the groove in front of the collar. The lateral margins are narrowly black. Mesonotum mostly black, the median arms of the W being fulvous, these fulvous lines broadening and extending laterad and caudad to the cruciform elevation which is greenish-brown. The lateral margins of the mesonotum are also fulvous. Abdominal terga black, the basal segment and the last three segments being pruinose in fresh speci-

mens. The wings have the veins, with the exception of the basally fulvous media, greenish-brown basally, becoming darker apically. The cross veins between R_3 and R_{4+5} and between the latter and M_1 are distinctly darkened. The basal areoles of the fore wings are greenish-brown. The flaps are grayish to brownish in color. Beneath the insect is olive-green and pruinose in fresh specimens. The legs are of about the same color.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	40.5 to 42
Width of head	18.5 to 19
Expanse of fore wings	116 to 122
Greatest width of fore wing	19 to 19.5
Greatest width of operculum	9.5
Greatest length of operculum	12

The opercula are very large and broad, separated at base medially, but overlapping quite strongly for a short distance, the outer margins slightly sinuate, and the apices broadly rounding.

Genitalia: The supra-anal plate of the male has a very broad but short median process which does not equal the rounded lateral angles. The uncus, when viewed laterally, is broad basally, narrowed medially, and then enlarged at the apex which somewhat resembles a horse's hoof. Viewed caudally it is a comparatively short and very broad sclerite with its truncate apex slightly but distinctly emarginate. The last ventral segment of the male is fully twice as wide as long, the margins slightly sinuately tapering to the rounded, almost truncate apex. The pygofers of the female have a broad and short but acutely-pointed median spine which scarcely exceeds the lateral angles. The last ventral segment of the female has the lateral margins practically straight and the broad angular emargination of the posterior margin extends half way to the base. The lateral pieces of the ovipositor each bears three slight ridges followed by about ten fairly distinct, rounded teeth.

Distribution: In the collection of the Kansas State Agricultural college are specimens which were taken in Riley county. Davis records specimens from Labette county also. As far as the writer knows these are the only two records of the occurrence of this insect in the state. Davis states that it is found from eastern Kansas and Nebraska to Michigan and Massachusetts, and southward along the coast to Florida. Van Duzee records it from Massachusetts, New York, New Jersey, Maryland, District of Columbia, North Carolina, South Carolina, Georgia, Florida, Alabama, Louisiana, Mississippi, Michigan, Missouri, and Kansas. It would seem, therefore, that Kansas is its western limit.

Remarks: Concerning the song of this species Davis writes: "Its song is monotonous in tone and not loud, considering the

size of the insect. It often commences to sing late in the afternoon and continues off and on until dark."

The specimens examined by the writer were taken in Georgia.

Tibicen dorsata (Say).

(Pl. xx, figs. 5-6; pl. xxiv, fig. 8; pl. xxvi, fig. 4; pl. xxvii, fig. 7.)

Cicada dorsata Say, Jl. Acad. Nat. Sci. Phila., iv, p. 331, 1825; Compl. Writ., ii, p. 252.
Thopha caria Walk., List Homop., i, p. 42, 1850.
Fidicina crassa Walk., Ins. Saund., Homop., p. 10, 1858.
Cicada dorsata Uhl., Bul. U. S. Geol. Geog. Surv., i, p. 342, 1876.
Cicada dorsata Uhl., Trans. Md. Acad. Sci., i, p. 152, 1892.
Cicada dorsata Tuck., Kans. Univ. Sci. Bul., iv, p. 64, 1907.
Cicada dorsata Davis, Jl. N. Y. Ent. Soc., xxiii, pp. 161, 164, 1915.
Tibicen dorsata Van D., Cat. Hemip. N. A., p. 495, 1917.

A large greenish-yellow and black species. Specimens at hand vary in length from 31 to 38 mm.

Color: Head mostly black but with yellowish-green spots running along antennal ledges to eyes, each of which spots usually contains a small black spot, and with irregular light spots along posterior margin laterad of the lateral ocelli. Also on the upper part of the front there is a small elliptical light spot. Pronotum yellowish-green, usually with the two attenuated, black, median triangles which enclose a light median line, and usually widen out making the groove cephalad of the collar black. Often only parts of these triangles are present. Sometimes the part back of the eyes is black as is also a very narrow portion of the lateral margins. The mesonotum has the following parts black: Between the arms of the W, a long posteriorly narrowing line on each side laterad of this, and a pair of narrower lines on the lateral margins, also a large triangular spot cephalad of the light cruciform elevation which sends an anterior process cephalad between the inner arms of the W. The arms of the W apically, the lateral margins and the depressions around the cruciform elevation, are all heavily pruinose. The abdominal terga are black with a row of dorsal white spots. The first segment has lateral white spots, the third segment often with a narrow pruinose line along the anterior margin, and the rest of the segments pruinose laterally, the last segment often being entirely pruinose. The wings have the veins, with the exception of the usually black base of media, yellowish-brown and becoming darker apically. The cross veins between R_3 and R_{4+5} and between the latter and M_1 are distinctly darkened. The basal areoles of the fore wings are brownish, and the flaps of both wings are grayish, the first ones with an orange tinge. The wings appear strongly vitreous due to the unusual corrugation of the membrane, and are slightly clouded apically. Beneath the insect is testaceous, the opercula lighter, and in fresh specimens is entirely pruinose. The legs are of about the same color as the under side, the posterior ones being darkest. They are distinctly striped.

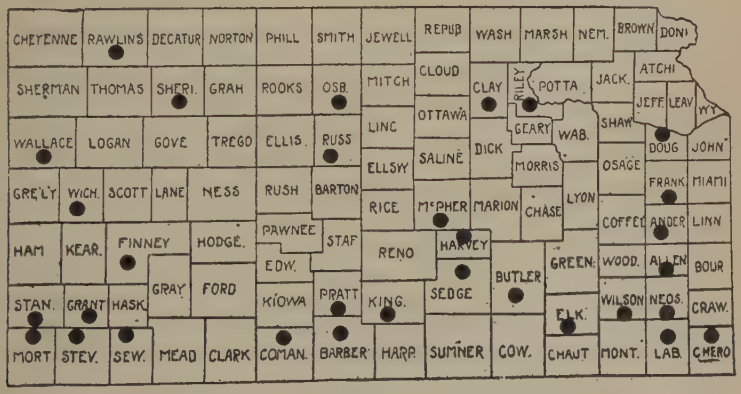
Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	31	to	38
Width of head	12.5	to	15
Expanse of fore wings	90	to	105
Greatest width of fore wing	15	to	19
Greatest width of operculum	6.5	to	8.5
Greatest length of operculum	9	to	14

The opercula are distinctly longer than broad, slightly overlapping medially, the lateral margins recurved, and the posterior margins evenly and broadly rounded.

Genitalia: Supra-anal plate of male roundly emarginate posteriorly, without any signs of a median tooth, the lateral angles strongly angulate. Uncus, viewed laterally, is broadest at the base, curving, the apex obtuse. Viewed caudally the general form is triangular, but the apex is quite broad and almost truncate. The ventral piece has two short and stout arms which are not deeply cleft. The last ventral segment of the male is not quite twice as broad as long and is very broadly rounded or nearly truncate posteriorly. The pygofers of the female have a short median spine which does not exceed the well-rounded lateral margins. The last ventral segment of the female has the lateral margins straight, the posterior margin with a rounded emargination reaching half way to the base. The lateral pieces of the ovipositor have well-developed teeth or ridges, about six of the thirteen on each side being prominent.

Distribution: Our records indicate that this species is our most widely distributed form in the state. It has been taken in over thirty counties from all parts of the state. The records from Russell and Riley counties are those of the Kansas State Agricultural College. Those from Clay and McPherson counties are by Davis. Van Duzee records it from the following other states: Missouri, Iowa, Nebraska, Arkansas, New Mexico, Texas and Colorado. The following map shows its distribution in Kansas:



Tibicen resh (Hald.).

(Pl. xx, figs. 3-4; pl. xxiv, fig. 7; pl. xxvi, fig. 2; pl. xxvii, fig. 5.)

Cicada resh Hald., Stansb. Salt Lake Exped., p. 369, pl. 9, fig. 17, 1852.
Cicada robertsoni Fh., Trans. N. Y. Agr. Soc., xiv, (1854), p. 745, 1855.
Cicada robertsoni Davis, Jl. N. Y. Ent. Soc., xxiii, p. 164, 1915, (synon. of *resh*).
Cicada resh Davis, Jl. N. Y. Ent. Soc., xxiii, p. 5, pl. 1, fig. 3, 1915.
Tibicen resh Van D., Cat. Hemip N. A., p. 493, 1917.
Tibicen resh Davis, Jl. N. Y. Ent. Soc., xxvi, p. 149, 1918.

A large yellowish-green and black species. Specimens at hand measure from 32 to 35 mm.

Color: Head mostly black, but with large triangular spots along antennal margins to eyes, an oval spot on upper portion of front, triangular spots at base of front, a spot just caudad of this, and irregular spots on each side along posterior margin laterad of the lateral ocelli, yellowish-green. Pronotum yellowish-green, marked with black as follows: Two small triangular spots on anterior margin which sometimes run backward and fuse with the black converging lines in the grooves which run back to the collar, and with two spots laterally in groove cephalad of collar. In dark specimens the entire anterior margin of the pronotum may be black, as well as the entire groove cephalad of the collar. Such forms have the two large black characteristic median triangles which enclose a median elongate greenish spot. Mesonotum largely black, with two elongate lateral greenish to brownish spots on each side and a median pair of spots of the same color which form the Hebrew letter *resh* inverted. The abdominal terga are black as a rule, but often have the posterior margins brownish. The wings have the veins greenish basally, with the possible exception of media, but they become brownish apically. The cross veins between R_1 and R_{4+5} and between the latter and M_1 are strongly darkened. The basal areole of the fore wings is greenish while the flaps of both wings are a brownish-gray. Beneath the insect is usually testaceous and in fresh specimens is pruinose. The legs are also testaceous, the femora streaked, and the tarsi and tibiæ darker.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	32	to	35
Width of head	14.5	to	16.5
Expanse of fore wings	98	to	107
Greatest width of fore wing	15	to	16
Greatest width of operculum	7	to	7.5
Greatest length of operculum	9	to	9.5

The opercula are about as broad as long excluding the extension beyond the coxal cavity. They overlap very slightly medially, and the posterior margins are broadly and evenly rounded.

Genitalia: The supra-anal plate of the male has a broad and stout but very low median process which does not equal the rather pointed lateral angles. The uncus, viewed laterally, is widest at the base, somewhat curving, and widened again apically, with the apex rather truncate. Viewed caudally it is a broad and short sclerite, the apex quite truncate and shallowly notched. The ventral piece has the slender arms widely

and deeply separated and each curves laterad apically. The last ventral segment of the male is nearly twice as wide as long, with the apex broad and truncate and with a very slight median emargination. The pygofers of the female have the usual stout and acute median tooth which far exceeds the distinctly angulate lateral angles. The last ventral segment of the female has the lateral margins distinctly sinuate and the broad angular emargination of the posterior margin reaches fully half way to the base. Each of the lateral pieces of the ovipositor bears about seven very indistinct and rounded teeth. Should this condition prove constant it would be of taxonomic value.

Distribution: While we have a goodly number of specimens of this species, an examination shows that they were all taken in Elk county and this seems to be our only record for the state. Van Duzee gives Mississippi, Louisiana, Oklahoma, Texas and Utah as the states in which it has been taken. Thus it seems to be more common in the South, and may prove to be distinctly southern if, as Davis surmises, the Utah record may not be authentic.

Tibicen marginalis (Walk.).

(Pl. xix, figs. 1-2; pl. xxiv, fig. 9; pl. xxvi, fig. 5; pl. xxvii, fig. 3.)

Cicada marginalis Walk., List Homop., iv, p. 1128, 1852 (n. n. for *marginata* Say).
Cicada marginata Say, Jl. Acad. Nat. Sci. Phila., iv, p. 330, 1825; Compl. Writ., ii, p. 251.
Cicada marginata Uhl., Stand. Nat. Hist., ii, p. 227, 1884.
Cicada marginata Woodw., Psyche, v, p. 68, 1888.
Cicada marginata Uhl., Trans. Md. Acad. Sci., i, p. 150, 1892.
Cicada marginata Macg., Can. Ent., xxxiii, p. 81, 1901.
Cicada marginata Sm. & Grsb., Ent. News, xviii, p. 128, 1907.
Cicada marginata Davis, Jl. N. Y. Ent. Soc., xxiii, p. 4, pl. 2, fig. 1, 1915.
Cicada marginata Davis, Jl. N. Y. Ent. Soc., xxiii, p. 240, pl. 18, figs. 2, 4, 1915.
Tibicen marginalis Van D., Check List Hemip., p. 55, 1916.
Tibicen marginalis Van D., Cat. Hemip. N. A., p. 493, 1917.
Tibicen marginalis Davis, Jl. N. Y. Ent. Soc., xxvi, p. 150, 1918.

A very large greenish and black or greenish-yellow and black species. Specimens at hand measure from 36 to 39 mm. Smith and Grossbeck state that specimens examined by them averaged over 40 mm.

Color: Head mostly black, with a broad greenish-yellow stripe along anterior margin from the front to the eyes, a spot of the same color on upper portion of front and also along posterior margin laterad of the lateral ocelli. Pronotum greenish-yellow with two, small, black, median, triangular spots at anterior margin and sometimes with black spots extending cephalad from collar to meet these, thus enclosing an elongate, light, median dash which frequently contains a black median line. Mesonotum mostly black, the W being greenish-yellow with the angles greatly enlarged and laterad of this is a large, almost fulvous spot on each side. The cruciform elevation is of about the same color as these lateral spots. Abdominal terga black with the posterior margins fulvous or testaceous as are also the tympanal coverings of the male. The wings have the veins greenish basally and brownish apically. The cross veins between R_2 and

R_{4+5} and between the latter and M_1 are not at all, or only slightly, infuscated. The basal areoles of the fore wings are green; the flaps of both wings are greenish-yellow. Beneath, the entire surface is brownish or testaceous and fresh specimens are pruinose, with the exception of the median portion of the abdomen in rubbed specimens. Legs of the same color as the under side, slightly darkening apically, and showing distinct ridges on the femora.

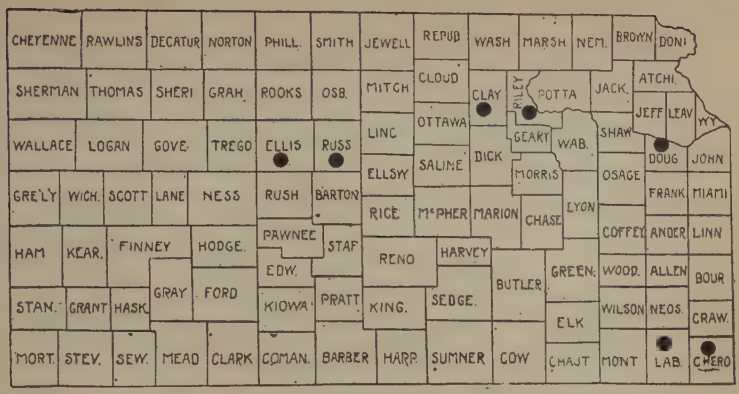
Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	36	to	39
Width of head	17	to	17.25
Expanse of fore wings	107	to	112
Greatest width of fore wing	17	to	18
Greatest width of operculum	7.5	to	8
Greatest length of operculum	8.5	to	9

The costal margin of the fore wings is distinctly bent near its middle. The opercula are only slightly longer than broad, overlap slightly for a short distance medially, and the posterior margins are broadly and evenly rounded.

Genitalia: The supra-anal plate of the male is roundingly and deeply concave between the lateral angles, and there are no signs of a median tooth. The uncus, viewed laterally, is stout and curving, and tapers to a rather obtuse apex. Viewed caudally it is triangular, the apex distinctly pointed but obtuse, and with the usual triangular depression on the upper portion of its dorsal aspect. The ventral piece is strongly V-shaped, the arms being quite stout. The last ventral segment of the male is nearly twice as broad as long, the sides slightly sinuate and the apex very broadly rounded or nearly truncate. The pygofers of the female have distinct but rounded lateral angles and a rather long, slender and acute median tooth. The last ventral segment of the female has the margins straight and the posterior margin is broadly and roundingly emarginate almost one-half the distance to the base. Each lateral piece of the ovipositor has about twelve teeth or ridges of which the median six teeth are quite distinct.

Distribution: This species has been taken in six counties in the state as shown by the following map. The localities here given would indicate its distribution at least over the eastern two-thirds of the state. The records from Riley, Russell, and Ellis counties are those of the Kansas State Agricultural College. Van Duzee records its occurrence in Florida, Ohio, Kentucky and Texas, as well as in Kansas. Davis says it is a central United States species.



Tibicen dealbata (Davis).

(Pl. xx, figs. 1-2; pl. xxiv, fig. 10; pl. xxvi, fig. 3; pl. xxvii, fig. 17.)
Cicada marginata var. *dealbata* Davis, Jl. N. Y. Ent. Soc., xxiii, p. 162, 1915.
Tibicen dealbata Van D., Cat. Hemip. N. A., p. 493, 1917.

A large green and black species, some specimens, however, being yellowish-brown and black. Specimens at hand measure from 32 to 37.5 mm., most of them averaging about 35 mm.

Color: Head yellowish-green, with a black transverse band between the eyes which is broadened medially to touch the posterior margin and the base of the front, the latter being black but with a greenish elliptical spot on its upper portion. Pronotum greenish, with two irregular median lines usually running from the anterior margin to the collar and enclosing a broad median stripe. These black lines, however, are often reduced to mere spots at the anterior margin and just cephalad of the collar. Mesonotum greenish or brownish, marked with black as follows: Between the arms of the W, a long posteriorly tapering line on each side laterad of this which attains the posterior margin and is connected to the W by a black line at about its middle, a narrower lateral stripe on each side, and a large spot cephalad of the cruciform elevation which sends a median process cephalad between the median arms of the W. In the specimens at hand the lateral margins, the portion in front of the cruciform elevation, and three short narrow stripes at the tips of the arms of the W are pruinose. The abdominal terga are black with the posterior margins of the segments and frequently the sides of the terminal segments, yellowish or brownish. Usually there is a dorsal median row of pruinose spots and the sides are strongly pruinose. The wings have the veins greenish basally and brownish apically. The cross veins between R_3 and R_{4+5} and between the latter and M_1 are usually slightly darkened. The basal areoles of the fore wings are greenish and the flaps are brownish while the flaps of the hind wings are more grayish. Beneath the body is greenish and in fresh specimens is entirely pruinose. The legs are also greenish but with a tendency to become brown apically.

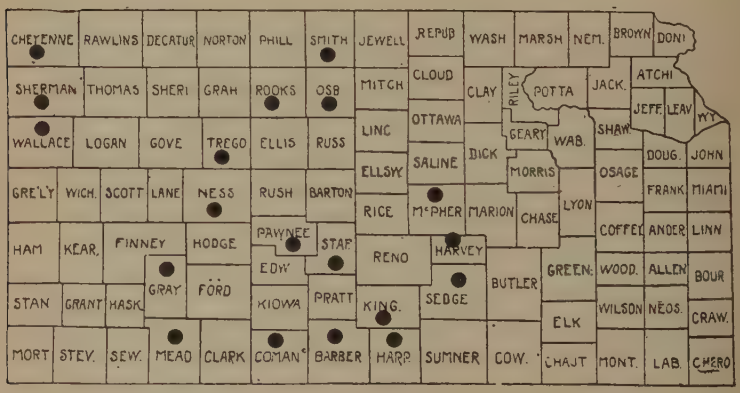
Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	32	to	37.5
Width of head	14.5	to	16.5
Expanse of fore wings	97	to	110
Greatest width of fore wing	17	to	18
Greatest width of operculum	6.5	to	7.5
Greatest length of operculum	9.5	to	10

The opercula are distinctly longer than broad if the extension beyond the coxal cavity be included. They overlap slightly for a short distance medially and the posterior margin is broadly rounded, the mesal portion distinctly longer and straighter than the outer part.

Genitalia: The supra-anal plate of the male is roundingly excavated apically and without a median tooth or with the bare suggestion of a very broad one. The uncus, viewed laterally, is regularly curved and narrowed to the obtuse apex. Viewed caudally it is distinctly triangular, the apex being quite pointed. The ventral piece has the arms deeply and rather narrowly divided to receive the apex of the uncus. The last ventral segment of the male is less than twice as wide as long and the apex is distinctly rounded. The pygofers of the female have a large but acute median spine which strongly exceeds the distinct lateral angles. The last ventral segment of the female is comparatively long, with the lateral margins distinctly sinuate and with the angular excavation of the posterior margin reaching slightly over one-third of the distance to the base. Each of the lateral pieces of the ovipositor bears three faint ridges followed by about ten teeth, the third to sixth of which are large and distinct.

Distribution: This species seems to be well distributed over the western two-thirds of the state as shown by the following map. Davis reports it from Colorado also.



Remarks: Davis originally described this species as a variety of *T. marginalis*, saying that he considered it as more of a mountainous form than the typical *marginalis*. Its recorded distribution in Kansas would seem to indicate the correctness of his view as to its ecological distribution.

Tibicen eugraphica (Davis).

(Pl. xxi, figs. 7-8; pl. xxv, fig. 2; pl. xxvi, fig. 7; pl. xxvii, fig. 2.)

Cicada eugraphica Davis, Jl. N. Y. Ent. Soc., xxiv, p. 52, pl. 5, fig. 3, 1916.
Tibicen eugraphica Van D., Cat. Hemip. N. A., p. 492, 1917.

A small black species marked with yellowish-orange. The specimens at hand measure from 18 to 24 mm., the average being about 22 mm.

Color: Head black, marked with yellowish-orange as follows: An elliptical spot on upper part of front, a spot on each side above antennæ and running along base of front, a spot on each side above the antennæ and between the latter and the eyes, and irregular spots laterad of lateral ocelli and running along posterior margin. Pronotum yellowish-orange, often with the two black median triangles entire though sometimes broken with orange, the grooves, humeral angles, and anterior margin of collar also irregularly black. Mesonotum yellowish-orange, marked with black as follows: Between the arms of the W, a pair of large spots laterad of these and extending to the posterior margin, small spots on the lateral margins, and caudad of the W a cross-shaped spot which, however, is often reduced to just the standard, on either side of which there are always two black dots. Abdominal terga usually black, sometimes dark brown, the posterior margins yellowish-brown. Fore wings with costal margins light to about the middle, beyond this, along with the rest of the veins, dark brown. Cross veins between R_3 and R_{4+5} and between the latter and M_1 are perfectly clear. The basal areoles of the fore wings are also clear, while the flaps of both wings are grayish. Beneath the insect is brownish, the opercula lighter, and in fresh specimens the whole surface is pruinose. The legs are yellowish-orange and streaked with testaceous.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	18 to 24
Width of head	8 to 9.25
Expanse of fore wings	62 to 69
Greatest width of fore wings	9 to 10
Greatest width of operculum	5
Greatest length of operculum	6

The opercula are distinctly wider than long excluding the extension beyond the coxal cavity. The mesal margins nearly or just touch, the lateral margins are sinuate, while the posterior margins are broadly and evenly rounded.

Gentalia: The supra-anal plate of the male has a broad rectangular notch apically in which is just the suggestion of a median tooth. Viewed laterally the lateral angles have a small but distinct anteriorly project-

ing tooth. The uncus, viewed laterally, appears stout, with a distinct backwardly-projecting knob at its central portion, and terminates in a stout but acutely-pointed claw which extends cephalo-ventrad. Viewed caudally it is wish-bone shaped, the arms strongly curving and rather well separated apically. The ventral piece has the arms separated by a broadly rounded incision so that they are pressed against the sides of the supra-anal plate. The last ventral segment of the male is about twice as wide as long, the lateral margins slightly sinuate, and the apex nearly truncate. The pygofers of the female have the lateral margins rounding to the acute median tooth. The last ventral segment of the female is a little over twice as wide as long, the angulate emargination of the posterior margin reaching about one-fourth of the distance to the base. The lateral pieces of the ovipositor each bear about nine rounded and quite distinct teeth cephalad of which there is an indistinct ridge.

Distribution: While there are a goodly number of specimens of this species in the Snow collection, an examination reveals that all our Kansas specimens were taken in Barber county. And this seems to be the only record for Kansas. Davis reports this species from Texas, Arizona and New Mexico. Thus it seems to be a distinctively southern form, and possibly reaches its northern limits in Kansas.

Remarks: Two of the specimens at hand are paratypes.

Tibicen vitripennis (Say).

(Pl. xxi, figs. 5-6; pl. xxv, fig. 3; pl. xxvi, fig. 6; pl. xxvii, fig. 4.)

Cicada vitripennis Say, Jl. Acad. Nat. Sci. Phila., ii, p. 236, 1830; Compl. Writ., ii, p. 372.

Cicada albipennis Woodw, Psyche, v, p. 68. 1888.

Cicada vitripennis Uhl., Trans. Md. Acad. Sci., i, p. 153, 1892.

Cicada vitripennis Macg., Can. Ent., xxxiii, p. 83, 1901.

Cicada vitripennis Snow, Kans. Univ. Sci. Bul., ii, p. 349, 1904.

Cicada erratica Osb., Ohio Nat., vi, p. 497, 1906.

Cicada erratica New., U. S. Dept. Agr., Div. Ent., Bul. 60, p. 52, 1906.

Cicada vitripennis Davis, Jl. N. Y. Ent. Soc., xxiv, p. 58, pl. 6, figs. 3-4, 1916.

Tibicen vitripennis Van D., Cat. Hemip. N. A., p. 497, 1917.

A rather small, usually greenish and black species which, however, varies to reddish-brown and black. Specimens at hand measure from 21 to 23 mm.

Color: Head black, with a broad, green band extending from the front along each side, along the antennal ledges to the eyes, and with large, green spots laterad of the lateral ocelli and extending along the posterior margin to the eyes. This leaves the black portion of the head in the form of a cross with a short and broad standard extending from the front to the posterior margin, and long and slender arms reaching to the eyes. Pronotum mostly green, with two black triangular spots on anterior portion which taper posteriorly and then widen just cephalad of the collar into triangular spots, the four enclosing an elongate median

green mark. The furrows are also more or less blackened and the lateral angles bear black spots which sometimes extend in a narrow line along the anterior margin of the collar. Mesonotum green, strongly marked with black as follows: Between the arms of the W, large triangular spots laterad of these tapering to posterior margin, and just caudad of the W, a distinct cross with a short and stout standard and with the apices of the arms enlarged. The cruciform elevation is light. Abdominal terga are black, the posterior margins testaceaus, the first segment and sometimes also the second, with a distinct median testaceous line. The wings, as described by Say, are "vitreous immaculate," the cross veins being not at all darkened. The veins of the fore wing, with the exception of media, are green basally and testaceous apically. The basal areoles of the fore wings are entirely clear, while the flaps of both wings are gray. Beneath the body is entirely pruinose in fresh specimens, except for the median black stripe on the abdomen. The opercula are lighter than the rest of the under side. The legs are pale brown, with a distinct tendency to have ridged femora and greenish tibiæ.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	21	to	23
Width of head	9		
Expanse of fore wings	66		
Greatest width of fore wing	9	to	9.5
Greatest width of operculum	5.25	to	5.5
Greatest length of operculum	6.5	to	6.75

The opercula are broad and short, the inner margins strongly angled, with the points of the angles distinctly separated, and with the posterior margins broadly rounded.

Genitalia: Supra-anal plate of male broadly and deeply excised between the rounded but slightly toothed lateral angles. Uncus, viewed laterally, is stout basally, with a short inner tooth and an outer larger curving and acutely-pointed one. Viewed caudally it is wish-bone shaped, the arms gradually separating to the apices. They are not as widely separated or as curving as in *T. eugraphica.* The ventral piece is strongly U-shaped, the arms rather short and slender and widely separated, fitting against the sides of the supra-anal plate. The last ventral segment of the male is not quite twice as wide as long, the sides sinuately tapering to the well-rounded apex. The margins of the pygofers of the female curve evenly to the base of the well developed and acute median spine. The last ventral segment of the female has the sides roundingly narrowed to the deeply emarginate posterior margin, the emargination reaching nearly half way to the base and having its margins slightly but distinctly emarginate. Each of the lateral pieces of the ovipositor bears about eleven teeth or ridges, of which six are large enough to be very distinctly seen.

Distribution: The only counties in the state from which we have records of this species are Clark, Sumner and Barber.

These being in the extreme southern part of the state, indicate the southern distribution of this species. This is confirmed by the distribution given by Van Duzee, who records it from the following states: Florida, Louisiana, Indiana, Oklahoma, Texas, and Arizona. Davis reports it from Nebraska also.

Remarks: Davis quotes Prof. R. W. Harned as stating that this species is found only on low ground or in swampy places. In his article on Mississippi cicadas he makes *Cicada erratica* a synonym of this species.

Subfamily CICADINÆ Van D.

The members of this subfamily do not have the perfect tympanal coverings possessed by the males of the preceding subfamily, nor are these coverings entirely absent, as in the males of the following subfamily. Our species are medium sized or small forms.

The two genera of this subfamily represented in the state may be separated by the following key:

KEY TO GENERA.

A. Abdomen translucent; cross vein between A_5 and R_{4+5} strongly oblique; tympanal coverings of male large. *Cicada.*

AA. Abdomen not translucent; cross vein between R_3 and R_{4+5} perpendicular or very slightly oblique; tympanal coverings of male very small. *Proarna.*

Genus CICADA Linn.

The members of this genus that occur in the United States are rather small forms. They agree with the genus *Tibicen* in having the tympanal orifices concealed by tympanal coverings, but not perfectly, and yet much better than in the genus *Proarna.* They also have relatively much smaller heads than do the members of the genus *Tibicen.* The abdomen is very characteristic, being distinctly translucent. The opercula are quite small and are widely separated. They differ also from the genus *Proarna* by having the cross vein between R_3 and R_{4+5} strongly oblique instead of perpendicular, as in the latter.

A single member of the genus occurs in the state.

Cicada hieroglyphica Say.

(Pl. xxiii, figs. 1-2; pl. xxv, fig. 6; pl. xxvi, fig. 16; pl. xxvii, fig. 20.)

Cicada hieroglyphica Say. Jl. Acad. Nat. Sci. Phila., vi, p. 235, 1830; Compl. Writ., ii, p. 371.

Cicada characterea Germ., Thon, Ent. Archiv., ii, p. 40, 1830.

Cicada hieroglyphica Harris, Rept. Ins. Mass., p. 176, 1841.

Tettigia hieroglyphica Dist., Biol. Centr. Am., Homop., i, p. 11, pl. 3, fig. 2, 1881.

Tettigia hieroglyphica Uhl., Stand. Nat. Hist., ii, p. 227, 1884.
Tettigia hieroglyphica Macg., Can. Ent., xxxiii, p. 83, 1901.
Cicada hieroglyphica Van D., Bul. Buf. Soc. Nat. Sci., ix, p. 184, 1909.
Cicada hieroglyphica Davis. Jl. N. Y. Ent. Soc., p. 60, pl. 6, fig. 5, 1916.
Cicada hieroglyphica Van D., Cat. Hemip. N. A., p. 496, 1917.
Cicada hieroglyphica Davis, Jl. N. Y. Ent. Soc., xxvi, p. 152, 1918.

A rather small green and black species with the abdomen more yellowish-brown. Specimens at hand measure from 20 to 25 mm.

Color: Head yellowish-green, with two transverse black lines before the eyes and four black longitudinal lines, the outer ones short, running caudad from these. Just mesad and caudad of each eye there are also black spots. Pronotum greenish-yellow, marked with two black median triangular spots, enclosing between them a long light band, and uniting in two smaller triangular spots just cephalad of the collar. The grooves are also black and there are black spots on the humeral angles and small black spots are scattered here and there over the surface. Mesonotum yellowish-green, marked with black as follows: A longitudinal median line, spots between the arms of the W, a small triangular spot on each side at anterior margin laterad of these, and a large spot laterad of these small spots, and a black spot on each side of the median line just cephalad of the light cruciform elevation. The abdominal terga are yellowish-brown, the last segment and supra-anal plate being darker and the second segment has a median dorsal black line. The wings have the veins tawny to brown and all four cross veins are darkened, there also being small brown dots near the tip of each vein. The basal areoles of the fore wings are clear and the flaps of both wings are gray with a tawny tinge. Beneath the insect is a little lighter than above and fresh specimens are quite pruinose. The legs are of about the same color as the under side, striped with testaceous, and darkened apically.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	20	to 25
Width of head	7	to 8
Expanse of fore wings	56	to 60
Greatest width of fore wing	8	to 9
Greatest width of operculum	3.5	
Greatest length of operculum	3	

The opercula are very small, evenly curving from the antero-lateral corner to the point where the two opercula come nearest together, but even at this point they are far apart. In the male the sternites of the abdomen are distinctly keeled.

Genitalia: The supra-anal plate, of the male is lightly chitinized dorsally at the apex and bears a small median process. The uncus, viewed laterally, is large, tapering ventrally, and ending in an obtuse apex which bears a small point extending cephalad. In the upper portion of its lateral aspect is a triangular membranous part which seems quite characteristic. Viewed caudally the uncus is narrow at the top, widest just below the middle, and its lower margin has a small median emargination. The last ventral segment of the male is nearly as long as broad,

the margins are slightly sinuate and the apex is broadly rounded. The pygofers of the female bear a long median spine and the margins are distinctly and obtusely angulate. The last ventral segment of the female is of about equal length throughout, the posterior margin bearing two small lobes on either side of a small median triangular excavation. The lateral pieces of the ovipositor bear rather weak teeth of which only two or three on each side are prominent, the remaining four or five being very indistinct. Cephalad of the teeth is a very weak ridge on each side.

Distribution: The only record of the capture of this species in Kansas comes from Chautauqua county. Van Duzee records it from the following states: New Jersey, Pennsylvania, North Carolina, Georgia, Florida, Mississippi, Louisiana and Texas. Thus it would seem that Kansas forms the northwestern limit of this species.

Remarks: The males of this species seem to be much more common than the females. Mr. Davis kindly loaned me one of the latter and states that they are comparatively uncommon. He says they occur most commonly in the pine barrens, "where in June and July their songs constitute an almost continuous performance."

Genus PROARNA Stal.

The members of this genus are very small cicadas. The tympanal coverings are very imperfect, leaving most of the tympanal orifice exposed. The abdomen is not translucent and the cross vein of the fore wings between R_3 and R_{4-5} is very characteristically perpendicular instead of oblique. The opercula are small and do not approach each other very closely.

A single member of the genus occurs in Kansas.

Proarna venosa (Uhl.).

(Pl. xxiii, figs. 5-6; pl. xxv, fig. 8; pl. xxvi, fig. 20; pl. xxvii, fig. 8.)

Prunasis venosa Uhl., Ent. Am., iv, p. 82, 1888.
Prunasis venosa Macg., Can. Ent., xxxiii, p. 77, 1901.
Prunasis venosa Dist., Cat. Homop., Cicadidæ, p. 152, 1906.
Proarna venosa Dist., Ann. Mag. Nat. Hist., ser. 8, viii, p. 134, 1911.
Proarna venosa Dist., Genera Ins., fasc. 158, p. 16, 1914.
Proarna venosa Van D., Cat. Hemip. N. A., p. 497, 1917.

A very small pale green to straw-colored species. Specimens at hand measure from 11 to 13 mm.

Color: Head greenish or straw-colored, with a more or less continuous brownish transverse band between the eyes and extending backward medially to enclose the ocelli. The antennal ledges also are usually somewhat brown. Pronotum yellowish-green, immaculate, or with the humeral angles darkened, and sometimes the grooves slightly darkened also. Some-

times there is a suggestion of the two dark median triangles on the anterior margin. Mesonotum yellowish-green, marked with brown as follows: Between the arms of the W, a large posteriorly tapering spot on either side laterad of this, the tips of the anterior arms of the light cruciform elevation, and two faint dots just cephalad of these. Abdominal terga straw-colored, with the bases of the segments, especially laterally, more or less marked with fuscous. The wings have the veins straw-colored or greenish basally, becoming brownish apically. The cross veins between R_3 and R_{4+5}, between R_{4+5} and M_1, and between M_1 and M_2 are sometimes slightly, but usually distinctly darkened, and there is a tendency for all the veins to be slightly smoky apically. The basal areoles of the fore wings are clear and the flaps of both wings are milky-white to straw-colored. Beneath, the insect is straw-colored or yellowish-green, with the opercula lighter. The legs are straw-colored with the femora distinctly banded with fuscous.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	11	to	13
Width of head	3.75	to	4
Expanse of fore wings	29	to	32
Greatest width of fore wing	4	to	5
Greatest width of operculum	2	to	2.5
Greatest length of operculum	2.5	to	3

The opercula are distinctly wider than long excluding the extension beyond the coxal cavity. They are widely separated medially and are broadly rounded from the cephalo-lateral angle to the angulate meso-caudal angle which slightly overlaps the metasternum.

Genitalia: Supra-anal plate of male with a very wide emargination posteriorly. Viewed laterally there is a very strong and acute dorsal point. The uncus, viewed laterally, enlarges apically and is bifid. Viewed caudally it is narrowest basally, widest just below the middle, and ends in four rounded lobes. The ventral piece consists of two very widely separated arms which lie against the supra-anal plate. The last ventral segment of the male is about twice as broad as long and the truncate posterior margin is very slightly emarginate medially. The pygofers of the female have a small median tooth which does not exceed the sinuated posterior margins. The last ventral segment of the female is about three times as wide as long, the posterior margin being broadly emarginated about one-third of the distance to the base, the sides of the emargination themselves being slightly notched. The lateral pieces of the ovipositor each bear two or three indistinct ridges which are followed by four prominent teeth and these by three smaller and indistinct ones.

Distribution: The only counties from which this species seems to have been taken are Sumner and Barber. Van Duzee records it from Texas and New Mexico. Accordingly Kansas seems to be the northern limit of its range.

Subfamily TIBICININÆ (Dist.).

The members of this subfamily differ from those of the preceding in that the males do not have any tympanal coverings at all. In the main they are small to medium sized forms.

There are four genera of the *Tibicininæ* represented in our Kansas fauna. These may be separated by the following key:

KEY TO GENERA

A. Cells of median area of fore wings distinctly longer than marginal cells.
  B. Head about as broad as base of mesonotum. Opercula nearly touching medially. *Tibicina.*
  BB. Head distinctly narrower than base of mesonotum. Opercula widely separated.
    C. Median transverse suture of elytra not very evident. *Okanagana.*
    CC. Median transverse suture of elytra very evident. *Tibicinoides.*
AA. Cells of median area of fore wings not distinctly longer than marginal cells. *Melampsalta*

Genus TIBICINA Kol.

The tympanal coverings are entirely absent in this genus, in this respect agreeing with the following three genera. It differs from them, however, in having a relatively broader head which is as broad as the base of the mesonotum. Added to this is the characteristic of the opercula which nearly touch medially. As in the two following genera the cells of the median area of the fore wings are distinctly longer than the marginal cells.

The single member of the genus and its variety occur in the state. Only the 17-year race has been definitely recorded from within our borders though the 13-year race comes so close in Missouri that it would be surprising if it did not extend westward over into the state.

Tibicina septendecim (Linn.).

(Pl. xxiii, figs. 9-10; pl. xxv, fig. 5; pl. xxvi, fig. 14; pl. xxvii, fig. 19.)

Cicada septendecim Linn., Syst. Nat., edn. 10, i, p. 436, 1758; edn. 12, ii, p. 708, 1767.
Tettigonia septendecim Fabr., Syst. Ent., p. 679, 1775.
Tettigonia costalis Fabr., Ent. Syst., Suppl., p. 516, 1798.
Cicada septendecim Germ., Thon, Ent. Archiv., ii, p. 4, 1830.
Cicada septendecim Harris, Rept. Ins. Mass., p. 167, 1841.
Cicada septendecim Harris, Treat. Ins. Inj. Veg., edn. 2, p. 180, 1852.
Cicada septendecim Jag., Life of N. Am. Ins., p. 64, 1859.
Tibicen septendecim Stal, Ann. Soc. Ent. Fr., ser. 4, i, p. 618, 1861.
Cicada septendecim Harris, Treat. Ins. Inj. Veg., edn. 3, p. 206, 1862.
Cicada septendecim Ril., 1st Mo. Rept., p. 18, 1868.

Tibicen costalis Stal, Hemip. Fabr., ii, p. 116, 1869.
Tibicen septendecim Stal, Hemip. Fabr., ii, p. 116, 1869.
Cicada septendecim Uhl., Stand. Nat. Hist., ii, p. 227, 1884.
Cicada septendecim Lintn., 2nd Rept. N. Y. St. Ent., p. 167, 1885.
Cicada septendecim Ril., Rept. U. S. Dept. Agr. for 1885, p. 233.
Tibicen septendecim Uhl., Trans. Md. Acad. Sci., i, p. 160, 1892.
Cicada septendecim Marl., U. S. Dept. Agr., Div. Ent., Bul. n. s. 14, 1898.
Tibicen septendecim Felt, N. Y. St. Mus. Memoir, 8, i, p. 231, pl. 46, fig. 2, 1905.
Tibicina septendecim Dist., Cat. Homop., Cicadidæ, p. 125, 1906.
Cicada septendecim Marl., U. S. Dept. Agr., Div. Ent., Bul. 71, 1907.
Tibicina septendecim Van D., Cat. Hemip. N. A., p. 500, 1917.
Tibicina septendecim Davis, Jl. N. Y. Ent. Soc., xxvi, p. 152, 1918.

A medium sized black and orange species. Specimens at hand measure from 28 to 30 mm.

Color: Head entirely black except sometimes for a small orange median triangle at the posterior margin. The eyes are either black or orange in the dead specimens. Pronotum black except laterally, the inflexed portions being of an orange tinge. Sometimes the collar is faintly tinged with the same color. Mesonotum black except for narrow lateral orange stripes. Abdominal terga black, the conjunctivæ often appearing orange as does the posterior portion of the last segment in the male. The wings have the costal margin and the veins distinctly orange basally, but apically they become brown. The whole wing, especially basally and apically is more or less smoky. The W at the cross veins is quite prominent. The basal areoles of the fore wings are a very dark brown. The flaps are grayish, tinged with orange. Beneath, the insect is mostly black but with at least the posterior margins of the abdominal segments nearly orange and with the light color extending up the sides. Often the abdominal sternites are entirely brown. The legs are an orange-brown, striped with testaceous, the tarsi darker.

Form: The following are the measurements in millimeters of the specimens at hand:

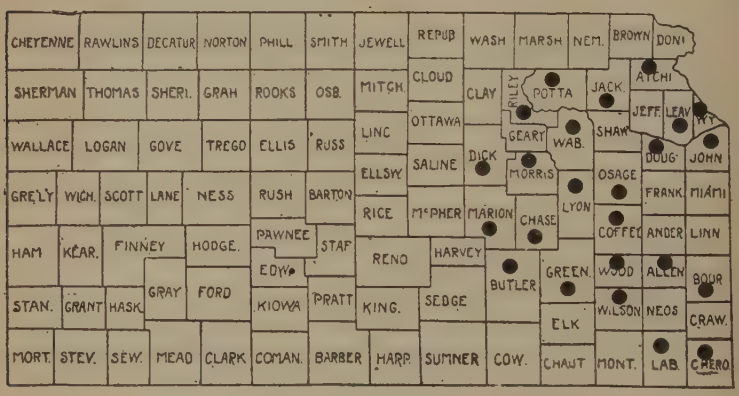
Length of body	28	to	30
Width of head	8.75	to	9.25
Expanse of fore wings	80	to	88
Greatest width of fore wings	12.5	to	13.5
Greatest width of operculum	3		
Greatest length of operculum	4.5		

The opercula are quite narrow, having the outer and posterior margins forming a semicircle, and their postero-mesal margins well separated.

Genitalia: The supra-anal plate of the male has a very large median projection. Viewed caudally its margins are inflexed below this median tooth, and each bears near its middle two curving, mesally projecting, finger-like processes and near the base a larger and more strongly haired one. The uncus, viewed laterally, has the form of a triangle with its apex bent strongly cephalad. Viewed caudally it has the form of two sclerites extending downward from the anal tube, encircling the penis, and widening below it into two triangular processes which taper to acute apices. The penis is usually strongly protruded from between the two parts of the uncus and possesses terminally two very characteristic little sclerites

which meet dorsally and are wide apart ventrally and whose rounded margins are strongly serrate. The last ventral segment of the male is about twice as wide as long, the lateral margins sinuate to the rounded posterior margin. The pygofers of the female have the margins evenly rounding to the prominent median spine. The last ventral segment of the female has a very large incision posteriorly which reaches over one-half the distance to the base. The ovipositor is provided with about thirteen quite even and similar teeth on each side.

Distribution: According to Marlatt, only Broods I and IV are known to occur in Kansas. The former brood is recorded by him (Bul. 71, U. S. Dept. Agr., Div. Ent., 1907) from Leavenworth and Dickinson counties. Brood IV is our big brood and is recorded from the counties marked on the following map. In addition to Marlatt's record, specimens have been taken from Atchison, Butler and Riley counties and these, with the records of Brood I, are included in the map. None of these broods go further west than Kansas, and it is very likely that other broods of the 17-year race and some broods of the 13-year race occur in the state, but there seem to be no records of them.



Remarks: Marlatt gives the three different notes characteristic of the song of this species as follows:

1. At the height of the season, when many males are singing together, the most characteristic note is represented by the letters tsh-e-e-E-E-E-E-e-ou. Thus it was described by Fitch.

2. Early in the season when few males have emerged the Pha-r-r-r-aoh note is heard.

3. The clicking note "consisting of from 15 to 30 short, quick sounds, sometimes double, the whole lasting about five seconds."

Tibicina septendecim var. *cassinii* (Fish.).

Cicada cassinii Fish., Proc. Acad. Nat. Sci. Phila., v, p. 272, 1851.
Cicada septendecim var. *cassinii* Ril., 1st Mo. Rept., p. 21, 1868.
Cicada septendecim var. *cassinii* Van D., Cat. Hemip. N. A., p. 501, 1917.

This variety occurs along with typical *septendecim*. It differs from the latter in being distinctly smaller and in usually having the under side of the abdomen entirely black. Riley states that the genital hooks of the male (uncus) vary considerably in this variety whereas they are constant in typical *septendecim*. At any rate they are often just like those of the latter.

Genus OKANAGANA Dist.

This is a very large genus the members of which are most abundant in the western states. As in *Tibicina* the cells of the median area of the fore wings are distinctly longer than the marginal cells. The head is clearly narrower than the base of the mesonotum. The opercula are widely separated. The transverse suture of the fore wings is not as distinct as in the following genus.

Only two species belonging to this genus are known to occur in Kansas. They may be separated by the following key:

KEY TO SPECIES.

A. Species smaller, less than 20 mm.; black and honey-yellow in color. *synodica.*

AA. Species larger, over 20 mm.; black marked with reddish or orange. *bella.*

Okanagana synodica (Say).

(Pl. xxii, figs. 5-6; pl. xxv, fig. 11; pl. xxvi, fig. 19; pl. xxvii. fig. 15.)

Cicada synodica Say, Jl. Acad. Nat. Sci. Phila., iv, p. 334, 1825; Compl. Writ., ii, p. 253.
Cicada synodica Uhl., Bul. U. S. Geol. Geog. Surv., i, p. 341, 1876; iii, p. 455, 1877.
Tibicen synodica Woodw., Psyche, v, p. 68, 1888.
Tibicen synodica Macg., Can. Ent., xxxiii, p. 78, 1901.
Okanagana synodica Dist., Cat. Homop., Cicadidæ, p. 126, 1906.
Okanagana synodica Van D., Jl. N. Y. Ent. Soc., xxiii. pp. 27, 40, 1915.
Okanagana synodica Van D., Cat. Hemip. N. A., p. 503, 1917.

A small black and honey-yellow species. Specimens at hand measure from 15 to 18.5 mm.

Color: Head mostly black, with a transverse line across antennal ledges and base of front, three triangular spots on posterior margin and median line on front, honey-yellow. Pronotum with entire margin honey-

yellow except for black spots on humeral angles. On either side of the pale median line are two large usually quadrate black spots, the grooves on either side of these are broadly black and parallel to the lateral margins, and extending on parallel to the adjacent portions of the posterior margins, are right-angled black marks on either side. The mesonotum is honey-yellow marked with black as follows: Between the arms of the W, a line extending back from these to the pale cruciform elevation with a dot on either side, and laterally two large triangular posteriorly tapering spots which reach the posterior margin. Abdominal terga black with the posterior margins honey-yellow, the terminal segments almost wholly light. The wings have the veins almost entirely honey-yellow but slightly darkening apically, and usually distinctly infuscated. The basal areoles of the fore wings are opaque and dark brown or brownish-yellow. The flaps are grayish tinged with yellowish or orange. Beneath the insect is almost wholly honey-yellow. The legs are of the same color but strongly marked with dark brown, the tarsi being dark.

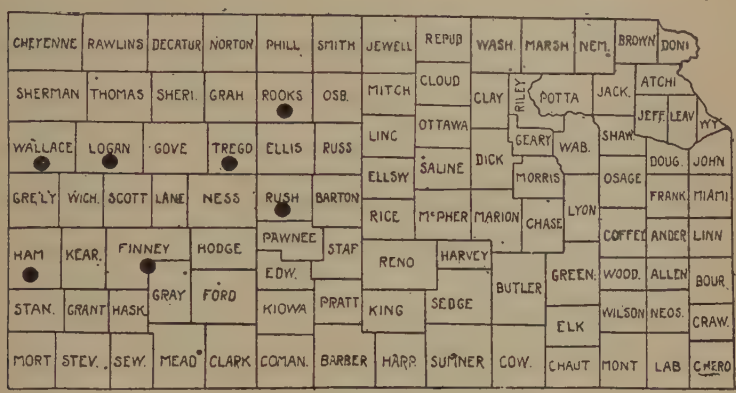
Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	15	to	18.5
Width of head	4.5	to	5.25
Expanse of fore wings	38	to	44
Greatest width of fore wing	5.75	to	6
Greatest width of operculum	1.25	to	2
Greatest length of operculum	2.5	to	2.75

The opercula are very small and narrow, strongly curved on both sides and ending in an obtusely pointed apex which points mesad and ends in about a line with the exterior margin of the coxa.

Genitalia: The supra-anal plate of the male is slightly but broadly emarginate on the posterior margin. The uncus, viewed laterally, is narrow basally, then widens to widest point and then tapers to rather obtuse apex. Viewed caudally it is broadly elliptical and slightly emarginate ventrally. The ventral piece has very stout arms which are deeply divided and whose apices suddenly narrow and turn slightly mesad. The last ventral segment of the male is distinctly less than twice as wide as long, the lateral margins are distinctly sinuate and the apex is truncate. The pygofers of the female have the posterior margins distinctly sinuate to the very small but distinct median tooth. The last ventral segment of the female has the lateral margins slightly sinuate and the posterior margin is broadly and deeply emarginate nearly three-fourths of the distance to the base. The ovipositor is stout and the lateral pieces are each supplied with about thirteen very regular ridges and teeth.

Distribution: This species occurs in the western part of the state as shown by the following map. The records from Wallace, Logan and Rooks counties are those of the Kansas State Agricultural College. Van Duzee records it from Colorado and New Mexico. Accordingly Kansas would seem to be the eastern limit of its range.



Okanagana bella Davis.

(Pl. xxii, figs. 3-4; pl. xxv, fig. 10; pl. xxvi, fig. 17; pl. xxvii, fig. 21.)

Okanagana bella Davis, Jl. N. Y. Ent. Soc., xxvii, p. 198, pl. 20, fig. 1, 1919.

A medium-sized black species, marked with reddish or orange. Specimens at hand measure from 21.5 to 22 mm.

Color: Head black, with antennal ledges, dash back of median ocellus, sometimes two spots at base of front and median line on upper portion of front, reddish-orange. Pronotum black, sometimes margined all around with orange, but always along the posterior margin. Mesonotum black, anterior arms of dark cruciform elevation spotted with orange and in front of them are two orange spots. The metanotum is black, the posterior margin being orange. Abdominal terga black, posterior margins narrowly orange dorsally, the orange band wider laterally. The wings have the costal margin orange to the end of the radial cell, the remainder of the veins being brown. The basal areole of the fore wing is dark brown, the flaps of both wings and parts of the bases of each wing being strongly orange. Beneath the insect is orange and black, the abdominal sternites with the posterior margins orange, the orange replacing the black more and more on the posterior segments. The legs are orange but strongly marked and striped with black.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	21.5 to 22
Width of head	7 to 7.25
Expanse of fore wings	60 to 65
Greatest width of fore wing	10 to 11
Greatest width of operculum	3
Greatest length of operculum	4
Length of valve	5

The opercula are very small, widest basally, then suddenly narrowed due to a sudden incurving of the lateral margin. Then they slightly widen again before the lateral margin meets the mesal margin in an obtuse point which points mesad. The valve is quite elongate and acutely pointed apically.

Genitalia: The supra-anal plate of the male is very slightly emarginate apically. The uncus, viewed laterally, is narrow basally, then widened, the margins subparallel till near the very slightly hooked apex. Viewed caudally it is emarginate apically and the emargination appears slightly notched on each side. The ventral piece has the arms very widely separated and each is slightly notched apically. The last ventral segment of the male is nearly as long as wide, the lateral margins distinctly sinuate and the posterior margin truncate. The pygofers of the female have the posterior margins slightly sinuate on either side of the stout median terminal projection. The last ventral segment of the female has the lateral margins strongly narrowed and the posterior margin is angularly emarginate fully one-half the distance to the base. The ovipositor is stout, the lateral pieces each bearing about a dozen broad teeth.

Distribution: The only record of the occurrence of this species in Kansas is that given by Davis who states that there is a pair of specimens of this species from this state in the collection of the Academy of Natural Sciences, Philadelphia. Presumably it occurs in the western part of the state. The specimens examined are from Colorado, Arizona, Utah and Oregon. In addition Davis names the following states where this species is known to occur: New Mexico, Wyoming, Montana, Idaho, California and Washington, and it also occurs in Alberta and British Columbia.

Remarks: As Davis mentions, members of this species have in the past been confused with *Okanagana rimosa* (Say).

Genus TIBICINOIDES Dist.

The members of this genus are very like those belonging to the genus *Okanagana*. The chief difference lies in the very evident median transverse suture of the fore wings which is much less distinct in the members of the latter genus.

A single member of the genus occurs in Kansas.

Tibicinoides hesperius (Uhl.).

(Pl. xxiii, figs. 3-4; pl. xxv, fig. 9; pl. xxvi, fig. 18; pl. xxvii, fig. 14.)

Cicada hesperia Uhl., Bul. U. S. Geol. Geog. Surv., i, p. 342, 1876.
Tibicen hesperia Uhl., Trans. Md. Acad. Sci., i, p. 161, 1892.
Tibicina? hesperia Dist., Cat. Homop., Cicadidæ, p. 125, 1906.
Tibicinoides hesperius Van D., Jl. N. Y. Ent. Soc., xxiii, pp. 27, 43, 1915.
Tibicinoides hesperius Van D., Cat. Hemip. N. A., p. 504, 1917.
Okanagana hesperia Davis, Jl. N. Y. Ent. Soc., xxvii, p. 218, 1919.

A rather small honey-yellow and black species with the wings clouded basally and strongly marked with reddish or orange. The specimens at hand measure from 19 to 21 mm.

Color: Head black, marked with yellowish as follows: The antennal ledges, a large median elliptical spot on upper portion of front, often three spots at base of front, and a median line caudad of median ocellus. Pronotum black, bordered entirely with a narrow yellow collar, with yellowish markings in grooves and on lateral parts. Mesonotum black, marked with yellowish as follows: Tips of outer arms of W and its bases, the extreme lateral margins, and cephalad of the black-spotted anterior arms of the light cruciform elevation. The metanotum is mostly yellowish. Abdominal terga mostly yellowish, the first two segments darker and with median and lateral darker lines on all the segments. Sometimes the abdomen is entirely black with only the posterior margins yellowish. The wings have the costal margin yellowish up to the tip of the radial cell, otherwise the veins are brownish to black. Usually the veins are heavily infuscated up to the marginal cells, giving the basal portion a brownish color. The basal areoles of the fore wings are heavily clouded with brown. The flaps of both wings are reddish or orange as are other parts of the base of the hind wings. Beneath, the insect is honey-yellow, strongly marked with black, the abdomen being lighter than the other parts. The legs are so heavily marked with black as to appear nearly entirely dark.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	19	to	21
Width of head	6.5	to	7.5
Expanse of fore wings	51	to	53
Greatest width of fore wing	7.5	to	9
Greatest width of operculum	3		
Greatest length of operculum	2.5		

The opercula are broader than long, widest at the base, then suddenly narrowed by the excavation of the lateral margin, the obtuse apex pointing mesad. The nodal furrow of the fore wings is very marked, forming a distinct transverse V with its arms widely separated.

Genitalia: The supra-anal plate of the male is very slightly but distinctly emarginate posteriorly. The uncus, viewed laterally, is widest near the base, the apex having a distinct downward hook due to a ventral preapical rounded incision. Viewed caudally it narrows apically and shows the lower margin to be distinctly emarginate. The ventral piece has its arms separated by a wide rounded incision and their apices are

turned distinctly mesad. The last ventral segment of the male is considerably less than twice as wide as long, the lateral margins are strongly sinuate, and the broad truncate apex is broadly and clearly incised. The pygofers of the female have the margins regularly curving to the small but stout median tooth. The last ventral segment of the female is quite characteristic, the lateral margins being sinuate while the posterior margin is deeply and angularly excavated over one-half the distance to the base, the margins of the excavation being distinctly notched. The ovipositor is short and stout, the teeth on the lateral pieces being quite rounded and even, about a dozen on each side.

Distribution: This species has been taken in the three western counties of Trego, Ellis and Russell. The latter two records are those of the Kansas State Agricultural College. Van Duzee records it from Colorado, Nevada, and California. Davis mentions New Mexico, Arizona and Montana as states where it occurs. It is very evidently a western species which reaches its eastern limits in Kansas.

Remarks: There seems to be some doubt as to the proper generic disposition of this species. Davis places it in the genus *Okanagana* because the relative size of the marginal cells and those of the median area of the fore wing is about the same as in the members of that genus. On the other hand the coloring of the fore wings is that of the genus *Tibicinoides* as is also the very conspicuous nodal furrow.

Genus MELAMPSALTA Kol.

These are very small cicadas. The tympanal coverings are lacking, and the venation of the fore wings is very characteristic in that the marginal cells are of about the same size or even longer than the cells of the median area.

The single member of the genus occurs in Kansas.

Melampsalta calliope (Walk.).

(Pl. xxiii, figs. 7-8; pl. xxv, fig. 7; pl. xxvi, fig. 21; pl. xxvii, fig. 6.)

Cicada calliope Walk., List Homop., i, p. 212, 1850.

Cicada parvula Say, Jl. Acad. Nat. Sci. Phila., iv, p. 233, 1825; Compl. Writ., ii, p. 253.

Cicada pallescens Germ., Thon, Ent. Archiv., ii, p. 8, 1830.

Carineta parvula Uhl., Ent. Am., iv, p. 22, 1888.

Cicada parvula Uhl., Trans. Md. Acad. Sci., i, p. 165, 1892.

Cicada parvula Macg., Can. Ent., xxxiii, p. 76, 1901.

Cicada calliope Kirk., Can. Ent., xli, p. 390, 1909.

Melampsalta parvula Van D., Bul. Buf. Soc. Nat. Sci., ix, p. 184, 1909.

Melampsalta calliope Van D., Cat. Hemip. N. A., p. 506, 1917.

Melampsalta calliope Davis, Jl. N. Y. Ent. Soc., xxvi, p. 154, 1918.

A very small yellowish-brown to greenish species. Specimens at hand measure from 12.25 to 15.5 mm.

Color: Head in brown forms either practically unmarked or with an irregular broad transverse black band with a distinct dash projecting cephalad on each side of the base of the front which itself is basally dark except for the light median portion. Pronotum of brown forms either unmarked or the grooves irregularly marked with black. The mesonotum of the brown forms has two short median and two large lateral black lines. The abdominal terga of the brown forms may be unmarked or darkened basally and laterally. The wings of the brown forms have brownish veins, the basal areoles of the fore wings are clear and the flaps of both wings are grayish with a brownish tinge. Beneath, the body is nearly uniformly brown, the legs being marked with darker lines. The green forms at hand are uniformly green except for a transverse black band on the head cephalad of the eyes, black spots below the antennæ, and the rostrum and tips of tarsi blackish.

Form: The following are the measurements in millimeters of the specimens at hand:

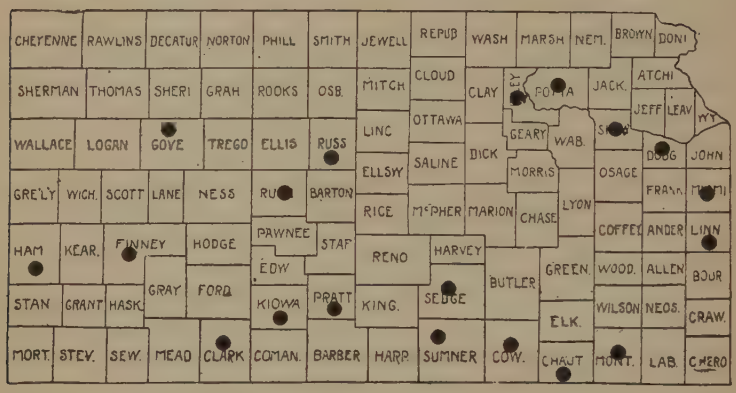
Length of body	12.25 to 15.5
Width of head	3.5 to 4.5
Expanse of fore wings	33 to 40
Greatest width of fore wing	5.5 to 7
Greatest width of operculum	3
Greatest length of operculum	3.25

The cells of the median area of the forewing are of about the same size or shorter than the marginal cells. This is most constant in regard to the relative length of cells 1st R_5 and 2nd R_5.

The opercula are quite small, about as broad as long, widely separated medially, and broadly rounding laterally and posteriorly.

Genitalia: The supra-anal plate of the male when viewed laterally is seen to be strongly pointed dorsally and to have a distinct caudally-projecting dorsal lobe on the posterior margin, just below which is a smaller rounded lobe. The uncus, viewed laterally, appears like a short, acute, curved process. Viewed caudally it consists of two diverging processes which taper to subacute apices. The last ventral segment of the male is triangular, about one-third wider than long, the lateral margins sinuately tapering to the obtuse apex. The pygofers of the female have the margins sinuate to the base of the large median spine. The last ventral segment of the female is very short and the posterior margin is broadly and triangularly emarginate nearly to the base. The ovipositor is equipped with about ten distinct and well rounded teeth on each side.

Distribution: This is a quite common species in the state. The records show it to be well distributed over Kansas as shown by the following map. The records from Riley and Russell counties are those of the Kansas State Agricultural College. Van Duzee records it from the following other states: New Jersey, North Carolina, Georgia, Florida, Tennessee, Louisiana, Arkansas, Illinois, Nebraska, Iowa, Colorado and Texas. Davis reports it from Mississippi also.



Explanation of Plates.

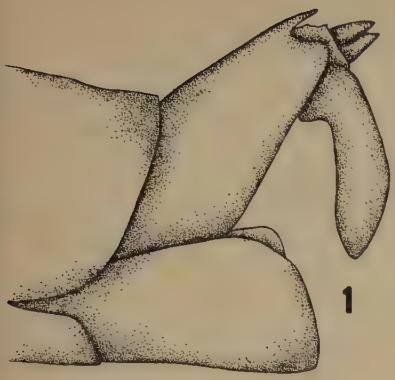
(353)

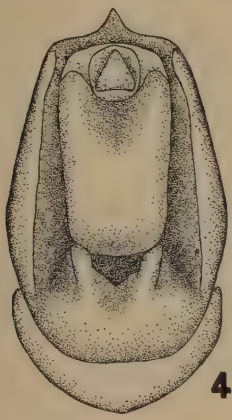
PLATE XVIII.

MALE GENITALIA—

1. Lateral view of *Tibicen linnei.*
2. Caudal view of *Tibicen linnei.*
3. Lateral view of *Tibicen pruinosa.*
4. Caudal view of *Tibicen pruinosa.*
5. Lateral view of *Tibicen lyricen.*
6. Caudal view of *Tibicen lyricen.*

PLATE XVIII.





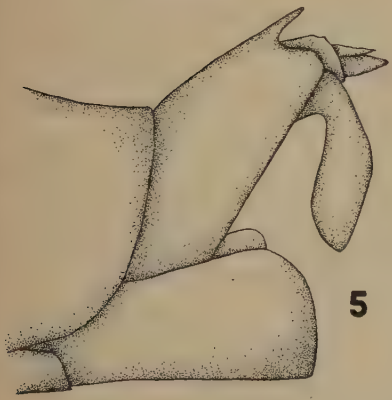


PLATE XIX.

MALE GENITALIA—

1. Lateral view of *Tibicen marginalis.*
2. Caudal view of *Tibicen marginalis.*
3. Caudal view of *Tibicen resonans.*
4. Lateral view of *Tibicen resonans.*
5. Caudal view of *Tibicen auletes.*
6. Lateral view of *Tibicen auletes.*

PLATE XIX.

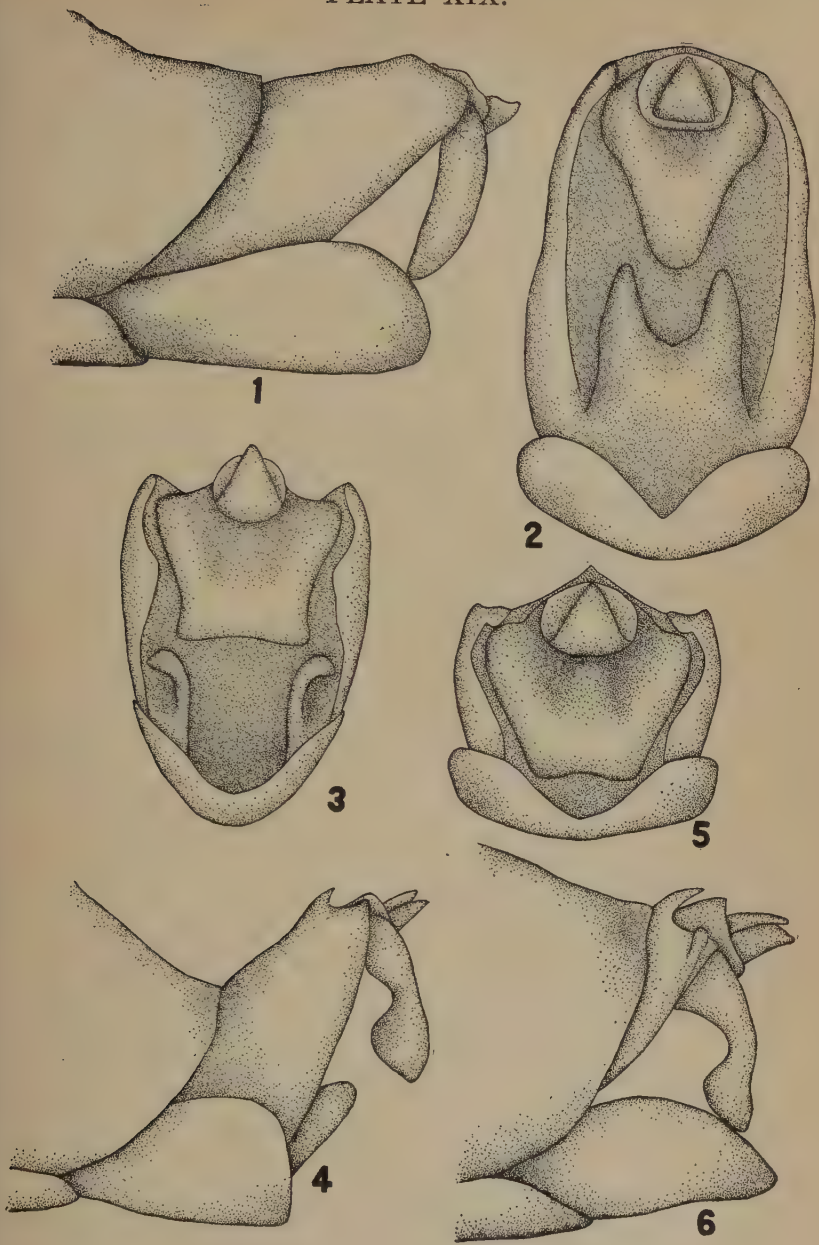
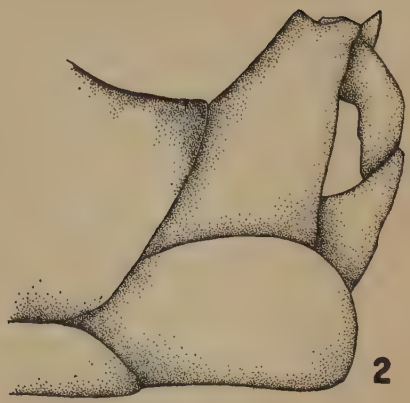


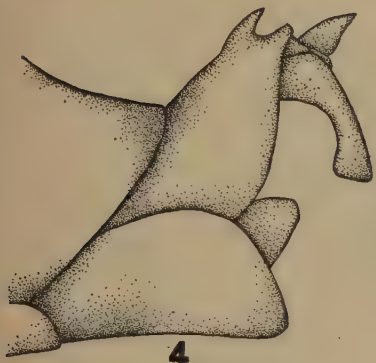
PLATE XX.

MALE GENITALIA—

1. Caudal view of *Tibicen dealbata.*
2. Lateral view of *Tibicen dealbata.*
3. Caudal view of *Tibicen resh.*
4. Lateral view of *Tibicen resh.*
5. Caudal view of *Tibicen dorsata.*
6. Lateral view of *Tibicen dorsata.*

PLATE XX.





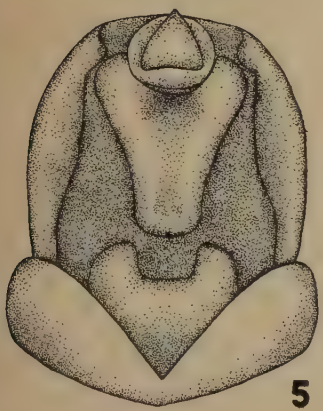


PLATE XXI.

MALE GENITALIA—

1. Lateral view of *Tibicen bifidus.*
2. Caudal view of *Tibicen bifidus.*
3. Lateral view of *Tibicen superba.*
4. Caudal view of *Tibicen superba.*
5. Caudal view of *Tibicen vitripennis.*
6. Lateral view of *Tibicen vitripennis.*
7. Caudal view of *Tibicen eugraphica.*
8. Lateral view of *Tibicen eugraphica.*

PLATE XXI

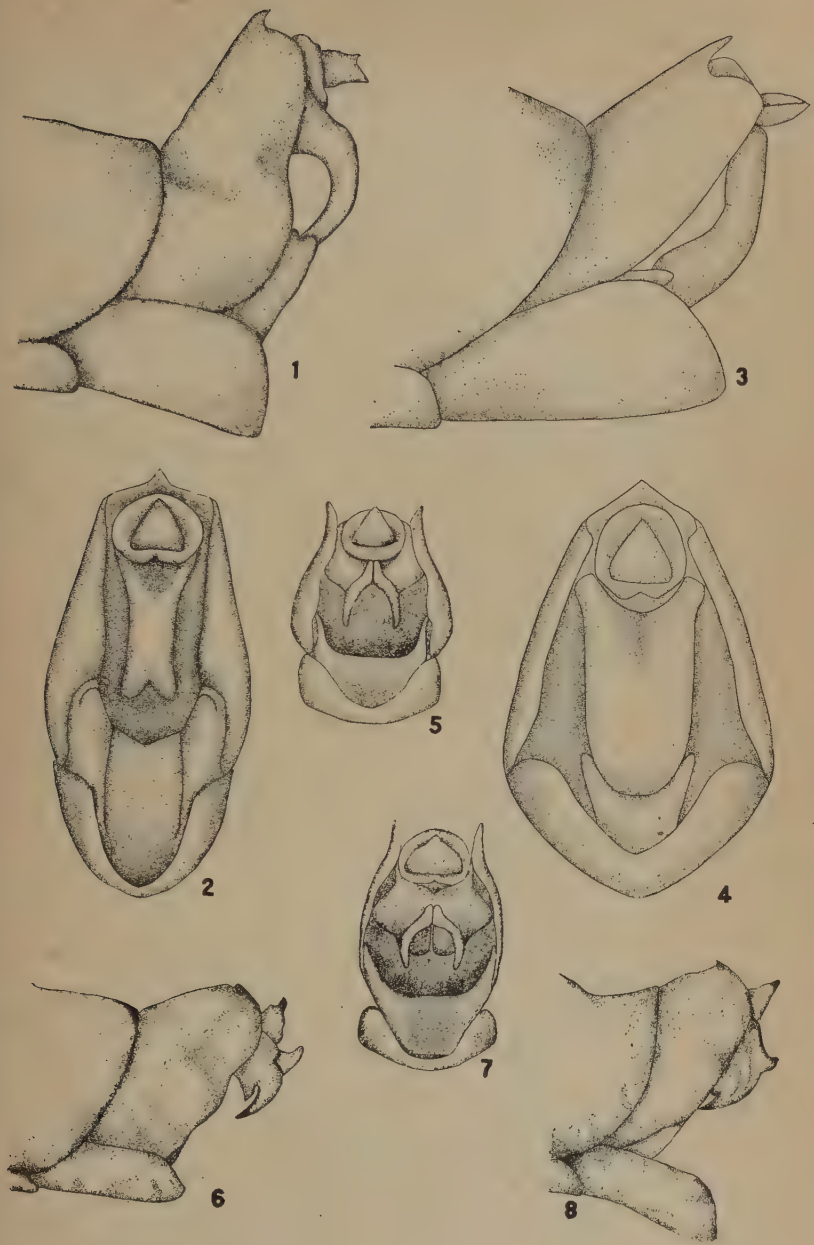
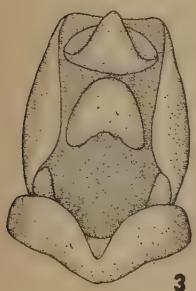


PLATE XXII.

MALE GENITALIA—

1. Lateral view of *Tibicen aurifera.*
2. Caudal view of *Tibicen aurifera.*
3. Caudal view of *Okanagana bella.*
4. Lateral view of *Okanagana bella.*
5. Lateral view of *Okanagana synodica.*
6. Caudal view of *Okanagana synodica*

PLATE XXII.



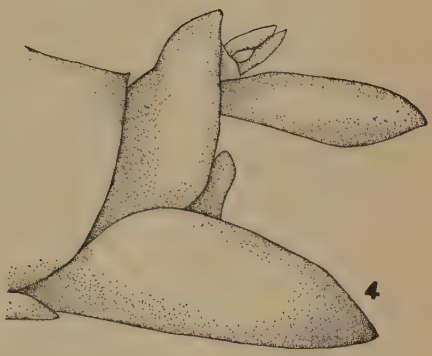
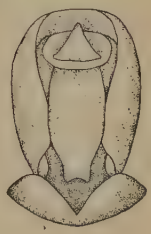


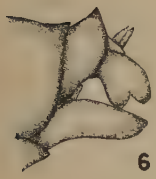
PLATE XXIII.

MALE GENITALIA—

1. Lateral view of *Cicada hieroglyphica.*
2. Caudal view of *Cicada hieroglyphica.*
3. Lateral view of *Tibicinoides hesperius.*
4. Caudal view of *Tibicinoides hesperius.*
5. Caudal view of *Proarna venosa.*
6. Lateral view of *Proarna venosa.*
7. Caudal view of *Melampsalta calliope.*
8. Lateral view of *Melampsalta calliope.*
9. Caudal view of *Tibicina septendecim* var. *cassinii.*
10. Lateral view of *Tibicina septendecim* var. *cassinii.*

PLATE XXIII.





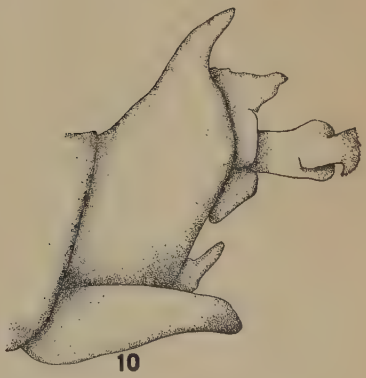


PLATE XXIV.

OVIPOSITORS—

1. *Tibicen lyricen.*
2. *Tibicen linnei.*
3. *Tibicen pruinosa.*
4. *Tibicen superba.*
5. *Tibicen aurifera.*
6. *Tibicen resonans.*
7. *Tibicen resh.*
8. *Tibicen dorsata.*
9. *Tibicen marginalis.*
10. *Tibicen dealbata.*

PLATE XXIV

1

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PLATE XXV.

OVIPOSITORS—

1. *Tibicen auletes.*
2. *Tibicen eugraphica.*
3. *Tibicen vitripennis.*
4. *Tibicen bifidus.*
5. *Tibicina septendecim.*
6. *Cicada hieroglyphica.*
7. *Melampsalta calliope.*
8. *Proarna venosa.*
9. *Tibicinoides hesperius.*
10. *Okanagana bella.*
11. *Okanagana synodica.*

PLATE XXV.

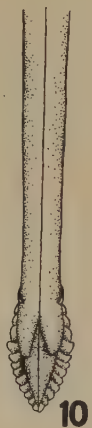


PLATE XXVI.

LAST VENTRAL SEGMENT OF THE MALE—

1. *Tibicen auletes.*
2. *Tibicen resh.*
3. *Tibicen dealbata.*
4. *Tibicen dorsata.*
5. *Tibicen marginalis*
6. *Tibicen vitripennis*
7. *Tibicen eugraphica.*
8. *Tibicen lyricen.*
9. *Tibicen bifidus.*
10. *Tibicen pruinosa.*
11. *Tibicen linnei.*
12. *Tibicen superba*
13. *Tibicen resonans.*
14. *Tibicina septendecim.*
15. *Tibicen aurifera.*
16. *Cicada hieroglyphica.*
17. *Okanagana bella.*
18. *Tibicinoides hesperius.*
19. *Okanagana synodica*
20. *Proarna venosa.*
21. *Melampsalta calliope.*

PLATE XXVI.

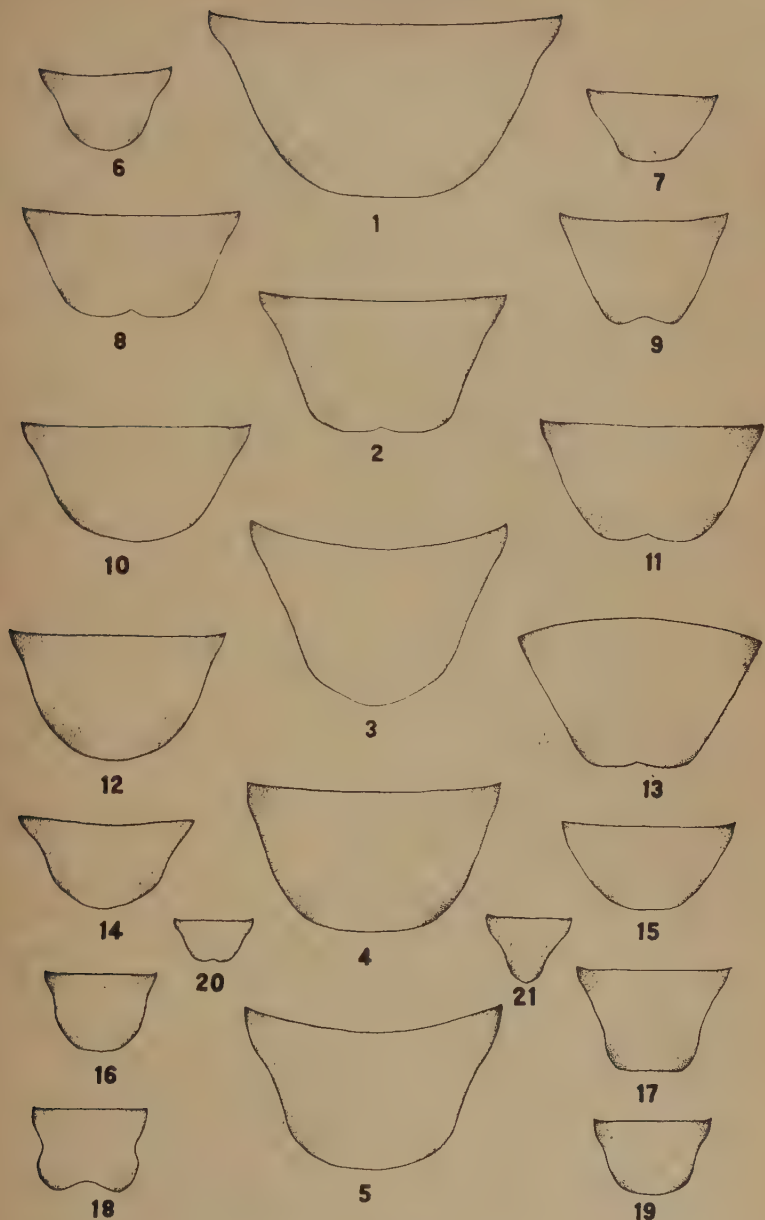
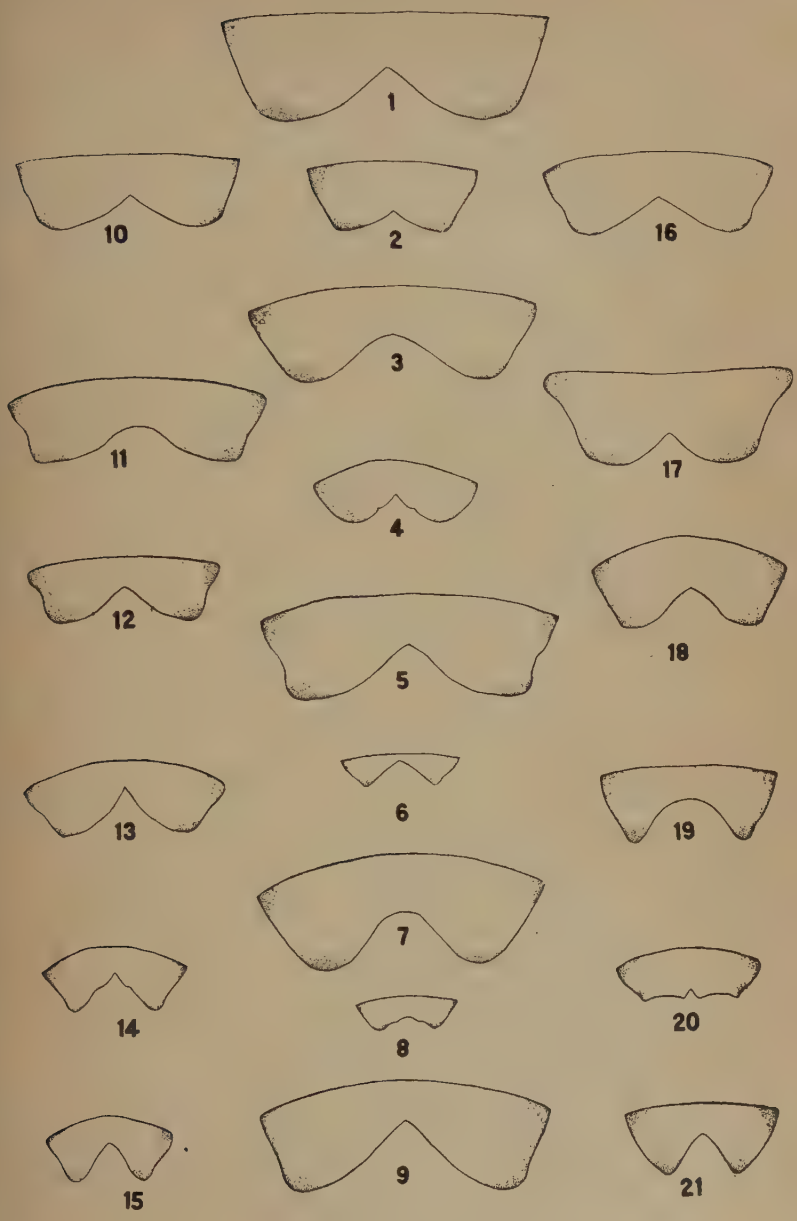


PLATE XXVII.

LAST VENTRAL SEGMENT OF THE FEMALE—

1. *Tibicen auletes*
2. *Tibicen eugraphica.*
3. *Tibicen marginalis.*
4. *Tibicen vitripennis*
5. *Tibicen resh.*
6. *Melampsalta calliope.*
7. *Tibicen dorsata.*
8. *Proarna venosa.*
9. *Tibicen resonans.*
10. *Tibicen pruinosa.*
11. *Tibicen lyricen*
12. *Tibicen aurifera.*
13. *Tibicen bifidus.*
14. *Tibicinoides hesperius.*
15. *Okanagana synodica.*
16. *Tibicen linnei.*
17. *Tibicen dealbata.*
18. *Tibicen superba*
19. *Tibicina septendecim.*
20. *Cicada hieroglyphica.*
21. *Okanagana bella.*

PLATE XXVII.



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